OPINION OF THE VEGETABLE GROWERS REGARDING VEGETABLE PROCESSING IN LUDHIANA DISTRICT OF PUNJAB

Thesis

Submitted to the Punjab Agricultural University
in partial fulfilment of the requirements
for the degree of

MASTER OF SCIENCE
in
EXTENSION EDUCATION
(Minor Subject: Vegetable Crops)

By

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(L-2009-A-20-M)

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2011

CERTIFICATE-I

This is to certify that the thesis entitled, **"Opinion of the vegetable growers regarding vegetable processing in Ludhiana district of Punjab"** submitted for the degree of **M.Sc.** in the subject of **Extension Education** (Minor Subject: **Vegetable Crops**) of the Punjab Agricultural University, Ludhiana, is a bonafide research work carried out by **Amandeep Arora (L-2009-A-20-M)** under my supervision and that no part of this thesis has been submitted for any other degree.

The assistance and help received during the course of investigations have been fully acknowledged.

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CERTIFICATE-II

This is to certify that the thesis entitled, **"Opinion of the vegetable growers regarding vegetable processing in Ludhiana district of Punjab"** submitted by **Amandeep Arora (L-2009-A-20-M)** to the Punjab Agricultural University, Ludhiana, in partial fulfilment of the requirements for the degree of **M. Sc.** in the subject of **Extension Education** (Minor Subject: **Vegetable Crops**) has been approved by the Student's Advisory Committee along with the Head of Department after an oral examination of the same.

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Dean, Post-Graduate Studies
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ACKNOWLEDGEMENT

First of all, with a sense of gratitude I bow to the ***'God Almighty'*** *for showering his blessings for the successful completion of this work and making another achievement in my life.*

Emotions cannot be adequately expressed in words because then emotions are transformed into mere formality. It is, indeed a great privilege to explicate my deep gratitude and respect towards my major advisor ***Dr. (Mrs) S. K, Saini,*** *Professor, Department of Extension Education for her friendly attitude, constant encouragement, constructive criticism and critical examination of the manuscript. Really I have no words to express my emotions for my Major advisor who played the role of a mother, a friend and a best advisor.*

I take this opportunity to express my deep sense of gratitude and veneration for the eminent Dean PGS' Nominee of my advisory committee ***Dr. (Mrs) R. K, Dhaliwal,*** *Professor cum head, Department of Extension Education for critically examining the manuscript, making valuable suggestions for its improvement and moral support during the whole tenure of my study.*

It is a great privilege for me to express my esteem and profound sense of gratitude to ***Dr. D. S. Khurana,*** *Professor, Department of Vegetable Crops and member of the Advisory Committee for his constructive and valuable suggestions, useful discussion and immense patience during the whole course of investigation and preparation of the manuscript.*

I express my gratitude, respect and thanks to ***Dr. (Mrs.) Prabhjot Kaur,*** *Professor, Department of Extension Education who guided me as her own son to perform a better task throughout the whole period of research.*

I am also thankful to other faculty members, ***Dr.D.S.Dhillon, Dr.(Mrs) R. K, Kalra, Dr. D. S. Ladher, Dr.(Mrs) T.K, Gill, Dr. C. S. Arneja, Dr. Vipan Kumar Rampal, Mr. D.S. Brar*** *for their cooperation during whole M. Sc. Degree programme.*

My words of gratitude for all the staff members of the Department of Extension Education.

I bow myself with profound reverence and sincere regards to ***my beloved family members [Mom-Dad , my sisters, my niece (Himani) and my fiancé (Gaganjyot Kaur)]*** *who have always been a guiding lamp in my life, installing me the importance of learning, believing in myself and urging me to strive for higher goals; I am indebted for life.*

I am highly indebted to ***Anil, Anmol, Baljinder, Gurbaj, Ketan, Navdeep, Rajkumar, Raman*** *who helped me a lot during my research investigation.*

I am highly indebted to the respondents for their cooperation during my data collection.

All are not mentioned, but none is forgotten.

Date :

Place : Ludhiana

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Signature of the student

Title of the thesis	**:**	**Opinion of the vegetable growers regarding vegetable processing in Ludhiana district of Punjab**
Name of the student and Admission No.	**:**	**Amandeep Arora L-2009-A-20-M**
Major Subject	**:**	**Extension Education**
Minor Subject	**:**	**Vegetable Crops**
Name and Designation of Major Advisor	**:**	**Dr. (Mrs.) S.K. Saini Professor , Department of Extension Education**
Degree to be Awarded	**:**	**M.Sc.**
Year of award of degree	**:**	**2011**
Total pages in thesis	**:**	**63 + Appendix + Vita**
Name of the University	**:**	**Punjab Agricultural University, Ludhiana – 141 004, Punjab, India**

ABSTRACT

The study entitled " opinion of the vegetable growers regarding vegetable processing in Ludhiana district of Punjab" was undertaken to know the opinion of the vegetable growers regarding vegetable processing, problems perceived by them in processing of vegetables and suggestions to overcome the perceived constraints in processing of vegetables. A total sample of 80 vegetable growers cultivating potato, tomato and chilli were taken for the present investigation. The data were collected through personal interviews. The findings of the study revealed that more than half of the respondents (52.50 per cent) belonged to the age group of 38-50 years and 43.75 per cent of the respondents were matriculates. Majority of the respondents (61.25 per cent) belonged to nuclear families whereas 51.25 per cent had upto 5 members in their family. A little more than one-third (38.75 per cent) of the respondents had medium operational land holdings. A little less than half (47.50 per cent) of the respondents had experience in vegetable cultivation varying from 9-16 years and income varying from 4.5-7 lacs/ annum. Most of the respondents had medium extension contacts, mass media exposure, innovativeness, economic motivation, risk bearing capacity and low scientific orientation. Most of the respondents cultivated potato on 12-19 acres, tomato on 1-2.5 acres and chilli on 1.2 acres of land. All the respondents had cultivated wheat on their farms along with the selected crops. All the respondents were of opinion that processing of vegetables is profitable but complex process that requires technical knowledge and huge initial investment. However it increases the shelf life and market value of the product. There was significant association between Education, operational land holding, income, innovativeness, scientific orientation, risk bearing capacity and economic motivation with willingness for processing of vegetables whereas family type, family size, experience in vegetable cultivation, extension contacts, mass media exposure had no significant association with willingness for vegetable processing. Lack of finance was the most serious problem perceived by respondents in processing of vegetables.

Key words: Vegetable processing, opinion, problems

Signature of Major Advisor **Signature of the student**

ਖੋਜ ਦਾ ਸਿਰਲੇਖ	:	ਪੰਜਾਬ ਦੇ ਲੁਧਿਆਣਾ ਜ਼ਿਲ੍ਹੇ ਦੇ ਸਬਜ਼ੀ ਉਤਪਾਦਕਾਂ ਦਾ ਸਬਜ਼ੀਆਂ ਦੀ ਪ੍ਰੋਸੈਸਿੰਗ ਬਾਰੇ ਵਿਚਾਰ
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ਸਹਿਯੋਗੀ ਵਿਸ਼ਾ	:	ਸਬਜ਼ੀਆਂ
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ਡਿਗਰੀ ਨਾਲ ਸਨਮਾਨਿਤ ਕਰਨ ਦਾ ਸਾਲ	:	2011
ਖੋਜ ਪੱਤਰ ਵਿੱਚ ਕੁੱਲ ਪੰਨੇ	:	63 + ਅੰਤਿਕਾ + ਵੀਟਾ
ਯੂਨੀਵਰਸਿਟੀ ਦਾ ਨਾਮ	:	ਪੰਜਾਬ ਖੇਤੀਬਾੜੀ ਯੂਨੀਵਰਸਿਟੀ, ਲੁਧਿਆਣਾ

ਸਾਰ ਅੰਸ਼

ਇਹ ਖੋਜ ਜਿਸ ਦਾ ਸਿਰਲੇਖ ''ਪੰਜਾਬ ਦੇ ਲੁਧਿਆਣਾ ਜ਼ਿਲ੍ਹੇ ਦੇ ਸਬਜ਼ੀ ਉਤਪਾਦਕਾਂ ਦਾ ਸਬਜ਼ੀਆਂ ਦੀ ਪ੍ਰੋਸੈਸਿੰਗ ਬਾਰੇ ਵਿਚਾਰ'' ਹੈ, ਸਬਜ਼ੀਆਂ ਦੀ ਪ੍ਰੋਸੈਸਿੰਗ ਬਾਰੇ ਸਬਜ਼ੀ ਉਤਪਾਦਕਾਂ ਦੇ ਵਿਚਾਰ ਅਤੇ ਪ੍ਰੋਸੈਸਿੰਗ ਵਿੱਚ ਆਉਣ ਵਾਲੀਆਂ ਸਮੱਸਿਆਵਾਂ ਨੂੰ ਦੂਰ ਕਰਨ ਲਈ ਸੁਝਾਅ ਜਾਨਣ ਲਈ ਕੀਤੀ ਗਈ ਸੀ। ਮੌਜੂਦਾ ਖੋਜ ਲਈ 80 ਸਬਜ਼ੀ ਉਤਪਾਦਕ, ਜੋ ਕਿ ਆਲੂ, ਟਮਾਟਰ ਅਤੇ ਮਿਰਚਾਂ ਦੀ ਕਾਸ਼ਤ ਕਰਦੇ ਸਨ, ਚੁਣੇ ਗਏ। ਅੰਕੜੇ ਵਿਅਕਤੀਗਤ ਮੁਲਾਕਾਤਾਂ ਰਾਹੀਂ ਇਕੱਠੇ ਕੀਤੇ ਗਏ। ਇਸ ਖੋਜ ਦੇ ਨਤੀਜਿਆਂ ਤੋਂ ਪਤਾ ਲਗਦਾ ਹੈ ਕਿ ਅੱਧ ਤੋਂ ਵਧੇਰੇ ਜੁਆਬਦੇਹ(52.50%) 38-50 ਸਾਲ ਦੀ ਉਮਰ ਦੇ ਸਨ ਅਤੇ 43.75% ਜੁਆਬਦੇਹ ਦਸਵੀਂ ਪਾਸ ਸਨ। ਜ਼ਿਆਦਾਤਰ ਜੁਆਬਦੇਹ (61.25%) ਇਕਹਿਰੇ ਪਰਿਵਾਰ ਵਾਲੇ ਜਦਕਿ ਅੱਧੇ ਤੋਂ ਜ਼ਿਆਦਾ ਜੁਆਬਦੇਹਾਂ (51.25%) ਦੇ ਪਰਿਵਾਰ ਵਿੱਚ ਵੱਧ ਤੋਂ ਵੱਧ 5 ਮੈਂਬਰ ਸਨ। ਇੱਕ ਤਿਹਾਈ ਤੋਂ ਥੋੜ੍ਹੇ ਜ਼ਿਆਦਾ ਜੁਆਬਦੇਹ 10-25 ਏਕੜ ਰਕਬੇ ਵਿੱਚ ਖੇਤੀ ਕਰਨ ਵਾਲੇ ਸਨ। ਅੱਧੇ ਤੋਂ ਥੋੜ੍ਹੇ ਘੱਟ ਜੁਆਬਦੇਹ (47.50%) 9-16 ਸਾਲ ਦਾ ਤਜ਼ਰਬਾ ਰੱਖਣ ਵਾਲੇ ਸਨ ਅਤੇ 4.5-7 ਲੱਖ ਸਲਾਨਾ ਆਮਦਨੀ ਵਾਲੇ ਸਨ। ਜ਼ਿਆਦਾਤਰ ਜੁਆਬਦੇਹ ਮੱਧਮ ਲਾਭਦਾਇਕ ਉਦੇਸ਼ ਰੱਖਣ ਵਾਲੇ, ਮੱਧਮ ਦਰਜੇ ਦਾ ਜੋਖਮ ਉਠਾਉਣ ਵਾਲੇ ਅਤੇ ਘੱਟ ਵਿਗਿਆਨਕ ਸੋਚ ਰੱਖਣ ਵਾਲੇ ਸਨ। ਜ਼ਿਆਦਾਤਰ ਜੁਆਬਦੇਹ 12-15 ਏਕੜ ਰਕਬੇ ਵਿੱਚ ਆਲੂਆਂ ਦੀ ਕਾਸ਼ਤ ਕਰਨ ਵਾਲੇ, 1-2.5 ਏਕੜ ਵਿੱਚ ਟਮਾਟਰ ਦੀ ਕਾਸ਼ਤ ਕਰਨ ਵਾਲੇ ਅਤੇ 1-2 ਏਕੜ ਵਿੱਚ ਮਿਰਚਾਂ ਦੀ ਕਾਸ਼ਤ ਕਰਨ ਵਾਲੇ ਸਨ। ਸਾਰੇ ਹੀ ਜੁਆਬਦੇਹ ਆਪਣੇ ਖੇਤਾਂ ਵਿੱਚ ਕਣਕ ਉਗਾਉਂਦੇ ਸਨ। ਸਾਰੇ ਹੀ ਜੁਆਬਦੇਹਾਂ ਦੇ ਵਿਚਾਰ ਮੁਤਾਬਿਕ ਸਬਜ਼ੀਆਂ ਦੀ ਪ੍ਰੋਸੈਸਿੰਗ ਇੱਕ ਲਾਭਦਾਇਕ ਪਰ ਗੁੰਝਲਦਾਰ ਪ੍ਰਕਿਰਿਆ ਹੈ, ਜਿਸ ਵਿੱਚ ਤਕਨੀਕੀ ਜਾਣਕਾਰੀ ਅਤੇ ਬਹੁਤ ਜ਼ਿਆਦਾ ਸ਼ੁਰੂਆਤੀ ਪੂੰਜੀ ਦੀ ਲੋੜ ਹੁੰਦੀ ਹੈ। ਸਬਜ਼ੀ ਉਤਪਾਦਕਾਂ ਮੁਤਾਬਿਕ ਪੂੰਜੀ ਦੀ ਕੰਮੀ ਸਬਜ਼ੀਆਂ ਦੀ ਪ੍ਰੋਸੈਸਿੰਗ ਵਿੱਚ ਆਉਣ ਵਾਲੀ ਸਭ ਤੋਂ ਗੰਭੀਰ ਸਮੱਸਿਆ ਸੀ। ਜ਼ਿਆਦਾਤਰ ਜੁਆਬਦੇਹਾਂ ਦੇ ਸੁਝਾਅ ਮੁਤਾਬਿਕ ਕਰਜ਼ਾ ਲੈਣ ਦੀ ਵਿਧੀ ਅਸਾਨ ਤੇ ਸੁਖਾਲੀ ਹੋਣੀ ਚਾਹੀਦੀ ਹੈ।

ਮੁੱਖ ਸ਼ਬਦ: ਸਬਜ਼ੀਆਂ ਦੀ ਪ੍ਰੋਸੈਸਿੰਗ, ਵਿਚਾਰ ਅਤੇ ਔਕੜਾਂ।

ਪ੍ਰਮੁੱਖ ਸਲਾਹਕਾਰ ਦੇ ਹਸਤਾਖਰ

ਵਿਦਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ

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Chapter-I

INTRODUCTION

In ancient times, plenty of food was available from natural resources and also due to hunting and wandering habits of man, no major problems were faced by mankind in terms of food security. Today population explosion has caused a great imbalance between the availability of food and its demand.

Hunger and malnutrition are the most threatening problems in the developing countries. Cereal based diet is the main feature of the Indian food habit. The meager intake of low cost protective foods, particularly vegetables are largely responsible for malnutrition among majority of our population. Major deficiencies in our diet are proteins, vitamins and minerals.

With the invention of high yielding varieties of rice and wheat, national food scenario has changed completely from the food shortage of mid-1960 to the surplus of the late 1990's and early years of 21st century. States like Punjab and Haryana played a leading role in the green revolution and made the country self-sufficient in food production. Rice and Wheat cultivation has emerged as a monoculture that resulted in two types of problems i.e. economic and ecological (Johal and Ray 2001). The Punjab state has the highest concentration of these two crops i.e. about 75 per cent of gross cropped area at all India level during the triennium ending 1990-2000 (Sangwan, 2002). We have already achieved about 75 per cent of the potential so far as wheat and paddy are concerned and there is hardly any scope left for increasing the productivity of these crops unless there is another technological breakthrough in development of new high yielding varieties of these crops. In this scenario, the next alternative which seems to be more attractive is to make a shift towards cultivation of fruits and vegetables. At present diversification seems to be the only option to secure the future of Agriculture.

Due to different agro-climatic regions, Indian soil is capable to produce diverse agricultural produce in large quantities. But due to inadequate storage, inaccessibility to market and glut during peak seasons, farmers often do not get reasonable price of their produce. In this situation one of the best options available is going for value addition of horticultural crops which increases the shelf life of the horticultural produce and also ensures its availability throughout the year to prevent glut in season and scarcity during off season.

Agriculture and Horticulture become major commercial ventures of critical socio-economic conditions. Vegetables are the integral part of our daily diet in all walks of society. Vegetables act as protective foods. Their use in daily diet demands a huge production in the country like India where population explosion out space all production resources.

India holds a vast potential for growing a large variety of horticultural crops. Vegetable farming refers to growing of vegetable crops for domestic and commercial purposes. India have divergent climatic conditions and hence a large number of vegetable crops and their varieties are in easy reach of farmers to grow them according to their suitability and socio- economic conditions. India ranks second in vegetable production after China (Anonymous, 2011)

"The Americans eat what they can and can what they cannot" clearly brings out the importance of processing of fruits and vegetables for better health and wealth. Unfortunately this has been neglected for a long time in India and hardly 2 per cent of the total production of fruits and vegetables are processed as against more than 70 per cent in countries like Malaysia, Philippines, Brazil and USA. The post-harvest losses of fruits and vegetables are estimated to be a staggering Rs.27700crores (Anonymous, 2008). Of late, the importance of fruit and vegetable processing industry was recognized and identified as the 'Sunrise Sector' for economic growth and attracted the 'Extreme Focus' by the Ministry of Commerce, Govt. of India.

Only two per cent of the horticultural crops are processed into value-added products (Anonymous, 2011). The processing of vegetables is confined only to the large farmers and big companies. India being a developing country, the post-harvest technology is not so developed and due to lack of processing units the post-harvest losses are high as compared to developed countries. So there is a need to create awareness among the farmers about processing of vegetables to increase the availability of vegetables and minimize the post-harvest losses.

Among the vegetable crops, three crops namely Potato, Tomato and Chilli are being processed in India. Potato is known as king of the vegetables. It is a wholesome food containing carbohydrates, proteins, minerals and vitamins. The Indian vegetable basket is incomplete without mentioning the king of the vegetables. The high production potential per unit area, high nutritional value and taste makes it one of the most important food crops of the world. It is also low in fat content. Potato is also very strategic crop from export point of view in our country. It is grown in winter under short days and is mainly harvested from January and March. Preferred for its taste worldwide, Indian potato meets international quality standards in terms of disease freeness, shape, size, skin color, flesh and dry matter content.

Most of the potato growers are not aware about the processing of this vegetable which greatly adds a value to this crop. Consequently a large amount of crop is wasted during the glut in main season. There is a strong need to motivate the farmers to increase

their income through processing of vegetables especially for potato. Processing of potato is done to change the form of potato into chips, flakes, french fries, cubes, powder etc. It does not only add value to the products but also increase the price and shelf life of stored product. During crop season, price is less as compared to off-season. Therefore processing of potato will fetch more income during off-season.

Chilli is the second vegetable crop which is valued for its diverse commercial uses. It is grown in almost all states of the country. It is gaining importance in the global market due its by-products viz. powder, oleoresin, chilli paste and chilli oil. The extract of chillies is used in production of ginger bear and other beverages. Capsaicin has many medicinal properties especially as an anti-cancerous agent and instant pain reliever. Moreover chillies have become an essential part of our daily diet. It is especially liked for its pungency, spicy taste and appealing color added to the food.

Chilli is highly perishable in nature. It requires more attention towards harvesting, storing and transporting. Most of the chilli growers sell their crop as fresh. The net return from this crop can be increased through its processing. Moreover different varieties are used for different markets. Less pungent varieties are preferred in international markets whereas more pungent varieties are used for national markets.

Dark green fruits are plucked for making chilli pickle. For export purpose chilli should be picked when the fruits are uniform in size and color. Dry powder of chillies can be kept at home also. The real return of the produce comes from its processed foods. Hence the farmers should go for processing of this crop to increase their net returns from this crop.

Tomatoes are now eaten freely throughout the world and their consumption is believed to benefit the heart among other organs. Tomato, universally treated as "protective food" is being extensively grown as annual plant all over the world. In India, tomato has wider coverage in comparison to other vegetables.

Tomato is also valued for its various by products. The main objective of processing is to supply wholesome, safe, nutritious and acceptable food to consumers throughout the year. Tomatoes and tomato-based foods are considered healthy due to less in calories and combination of antioxidant micronutrients.

Tomato contains lycopene, one of the most powerful natural antioxidants. Lycopene, especially in cooked tomatoes, has been found to help prevent prostate cancer. Lycopene has also been shown to improve the skin's ability to protect against harmful Ultra-Violet rays. The demand for tomato processing usually arises from a need to preserve the product for cooking purposes (inclusion in stews, soups, curries etc.) out of season or to add value for extra income. Traditionally, the most important methods used are concentration (to a paste or

purée) and drying either fruit pieces or to a powder. These remain the most suitable processes for many people to use and form the bulk of this brief. It should be noted that high quality 'salad' tomatoes have the highest value when sold fresh and in good condition. These are not normally used for processing. Other varieties have a great scope in processing industry due to number of value added products obtained from it which includes tomato ketchup, green tomato chutney, tomato squash, tomato soup and tomato jam etc.

Benefits of food processing include toxin removal, preservation, easy marketing and increasing food consistency. In addition, it increases seasonal availability of many foods, enables transportation of delicate perishable foods across long distances and makes many kinds of foods safe to eat by de-activating spoilage and pathogenic micro-organisms. Modern supermarkets would not be feasible without modern food processing techniques. Long voyages would not be possible and military campaigns would be significantly more difficult and costly to execute. Processed foods are usually less susceptible to early spoilage than fresh foods and are better suited for long distance transportation from the source to the consumer. When they were first introduced, some processed foods helped to alleviate food shortages and improved the overall nutrition of population as it made many new foods available to the masses.

The act of processing can improve the taste of food significantly. Mass production of food is much cheaper overall than individual production of meals from raw ingredients. Therefore, a large profit potential exists for the manufacturers and suppliers of processed food products.

Processed food frees people from the large amount of time involved in preparing and cooking "Natural" unprocessed foods. The increase in free time allows people much more choice in life style than previously allowed. In many families the adults are working away from home and therefore there is a little time for the preparation of food based on fresh ingredients. The food industry offers products that fulfill many different needs. From peeled potatoes that only have to be boiled at home to fully prepare ready meals that can be heated up in the microwave oven within a few minutes. Modern food processing also improves the quality of life for people with allergies, diabetics, and other people who cannot consume some common food elements. Food processing can also add extra nutrients such as vitamins.

India ranks first in the world in production of fruits and second in vegetables, accounting roughly eight and fifteen per cent, respectively, of total global production (Anonymous, 2011). India have a strong and dynamic food processing sector playing a vital role in diversifying the agricultural sector, improving value addition opportunities and creating surplus food for agro-food products. Presently, a mere 2 per cent of fruits and

vegetables are processed, even as the country ranks second in the world in terms of production. Less than two per cent is being processed as against 70 per cent in Brazil, 78 per cent in Philippines and 80 per cent in Malaysia (Anonymous, 2008).

Due to increase in standard of living in the cities and the rapid urbanization taking place in the rural areas, consumption of processed products is expected to increase steadily. Farmers do not go for processing of vegetables individually due to some apprehended problems in their minds. Therefore there is a need to know the opinion and problems regarding processing of vegetables. Keeping all these facts in view, the present study entitled "Opinion of the vegetable growers regarding vegetable processing in Ludhiana district of Punjab" was undertaken under following objectives:

1.1 Objectives

1.1.1 To study the socio-personal characteristics of the vegetable growers.

1.1.2 To study the opinion of vegetable growers about processing of vegetables.

1.1.3 To study the problems perceived by the vegetable growers in processing of vegetables.

1.1.4 To seek suggestions from the vegetable growers to overcome problems perceived by them in processing of vegetables.

1.2 Importance and scope of the study

The present study indicates the opinion of the vegetable growers regarding vegetable processing. It indicates how far the vegetable growers regard processing of vegetables as a profitable enterprise. It has been observed from the findings that most of the farmers have favourable opinion towards vegetable processing. Vegetable growers also perceived different kind of problems in processing of vegetables related to processing technology, equipments/machines, credit, marketing, transportation, availability of time, availability of labor, availability of power, storage problems etc. The information generated from the findings of the study will help extension personnel of Department of Horticulture to reorient their strategies to motivate the farmers to go for processing of vegetables and to solve the constraints perceived by the farmers. There is need to create awareness about processing of vegetables amongst farming community. This would not only provide economic benefits to the farmers but also would lead to diversification on agriculture which is of utmost importance to break wheat-rice monoculture.

1.3 Limitations of the study

1.3.1. The study is limited to Ludhiana district of Punjab, so the comprehensive results could not be obtained.

1.3.2. The findings of the study are based on the expressed opinions of the respondents. Although every effort has been made to get accurate information from the respondents, the possibility of the respondents giving some biased information can't be completely ruled out since some vital information could have been kept back.

1.3.3. The study was limited to only three vegetables namely Potato, Tomato and Chilli.

1.3.4. Being a student's projects, it has all those limitations which are common in such areas i.e. the limitations of time, money and other resources.

Chapter-II

REVIEW OF LITERATURE

Any research is planned and executed on the basis of what and how much work has already been done or accomplished in a particular sphere and related area of significance at a particular time. A review of literature, thus, provides a gainful insight which would help in the development of research methodology, selection of study sample, operational definitions of concepts, interpretation of the findings and discussion of results of research problem under study. So, it is desirable to review the relevant literature thoroughly while handling a research problem. Although, very limited research work has been done in this area, the researcher has tried his level best to collect most relevant review on this topic, some cross references and indirectly related references for supporting the research work.

The available review of the related studies has been given under the following heads:

2.1 Socio-personal characteristics.

2.2 Opinion of the farmers.

2.3 Relationship between selected variables

2.4 Problems perceived by the farmers.

2.1 Socio-personal characteristics

Mangat (1989) found that 68.67 per cent of the members of Punjab Naujavan Kisan Sanstha hailed from nuclear families and the remaining 31.33 per cent belonged to joint families. It showed that joint family system is losing its importance. He also found that majority of members of Punjab Naujavan Kisan Sanstha 74.67 per cent belonged to families having more than five members while 25.33 per cent of the families were small.

Kaur (1991) observed that 57.5 per cent of farm women belonged to joint family and 42.5 per cent belonged to nuclear family. She further indicated that maximum farm women 59 per cent belonged to family size of five to eight members. Only 30 per cent respondents had family size of two to five members and also reported that 58 per cent farm women had low extension contacts and only negligible percentage of the respondents had high extension contacts.

Kaur (1993) found that most of the vegetable growers belonged to the middle age group, more than half of the respondents were educated from primary to matriculate and had medium land holding.

Nahar (1993) reported that majority of vegetable growers were middle in age and 52 per cent of vegetable growers were illiterate.

Hakim (1998) reported that almost one fourth of the muskmelon growers had education upto middle, 56.00 per cent had annual gross income upto Rs. 1,40,000 and 54.50 per cent had an operational land holding upto eight acres. More than three fourth of the respondents had low to medium level of scientific orientation. He also reported 44.0 per cent of the respondents had low, 39.0 per cent of the respondents had medium and 17.0 per cent respondents had high level of extension contacts. Further the study reported that more than three-fourth of the respondents (78%) had low to medium level of scientific orientation. He also reported that 47.5 per cent of the respondents had low, 37.0 per cent of respondents had medium and 15.3 per cent of respondents had high mass media exposure. He further reported that 45.5 per cent of the respondents were illiterates and 19.5 per cent had education upto primary while 24.0per cent had education upto middle. Only 6.0 per cent had education upto high school and 5.0 per cent were graduates and above.

Singh (1998) found that 45.8 per cent of farmers of Punjab were in the age group of 20 to 35 years whereas 30.8 per cent belonged to the age group of 35 to 50 years. The remaining 23.4 per cent were above 50 years of age. He also reported that 27.5 per cent of farmers of Punjab were primary pass whereas 25.8 per cent were middle pass, 25.8 per cent were matriculates ,18.4 per cent of respondent were illiterate and only 2.5 per cent fell in the category of graduation and above. His study further indicated that most of the farmers of Punjab 70.8 per cent were living in nuclear families and 29.2 per cent of respondent were living in joint families. He found that 31.67, 40.67 and 26.66 per cent of respondent belong to small, medium and large size families. Further he reported that about half of the farmers of Punjab (51.6%) had 10-30 acres of operational land holdings. As many as 23.4 per cent of the respondents had operational land holdings of above 30 acres, while 25% possessed less than 10 acres of land holdings.

Josan (2002) found that majority of the pea growers belonged to middle age group (32-46 years). About one third of the pea growers were matriculate and 78.95 per cent of respondents had operational land holding of 2 to 18 acres.

Kaur (2002) found that majority of vegetable seed growers were in middle age category. More than 50 per cent of the respondents had education from primary to middle level and only 2.39 per cent of respondents were post graduates.

Khangura (2002) conducted a study on adoption of selected recommended practices for the pea cultivation. He found that 50.40 per cent of the respondents had education level from 6^{th} to 10^{th} standard, 43.20 per cent respondents had 6 to 25 acres of operational land holding. He also found that majority of pea growers (51.20%) had low mass media exposure

while 47.20 per cent of the respondents got motivation to start pea cultivation from fellow farmers.

Sharma (2002) in his study on Chilli growers in Amritsar and Sangrur districts of Punjab State reported that nearly half of the respondents (49%) belonged to 50-60 years of age group, 53.5 per cent were educated up to middle, majority (46.55%) had annual income upto Rs. 1,10,000 and 47 per cent had medium level of scientific orientation.

Prasad (2005) found that farmers of different groups grew Chilli, had matric to post graduate level of education and possessed less than 19 acres of land.

Singh (2005) found that half of turmeric growers (50%) belonged to young age group category. A little more than half of the respondents (53%) had educational qualification upto senior secondary. A little more than three fourth of the respondents(78.75%) operating on 5 to 22 acres of land and a little less than half of the respondents (45%) had high risk orientation.

Kumar (2006) reported that half of the respondents belonged to age group of 37-47 years whereas 27.50 per cent of the respondents belonged to age group of 25-37 years. A little less than one-fourth of the respondents were in age group of 47-65 years.

Kaur (2007) found that majority of vegetable growers belonged to middle age group (35-60 years) and had 5 to 25 acres of operational land holdings. As far as educational level was concerned 41.25 per cent of the respondents were educated up to matriculation level.

Kumar (2007) found that maximum number of the respondents (50.83%) belonged to age group of 34 to 43 years and 36.37 per cent of the respondents were matriculates. About 59.17 per cent of respondents had operational land holding between 3 to 14 acres. It was also found that majority of the respondents (51.67%) had low scientific orientation and 40.00 per cent of respondents had ‘medium’ risk bearing capacity.

Sharma (2007) found that 45.33 per cent respondents belonged to age category of 27 to 36 years. About half (50.66%) of the respondents were either matric or senior secondary. Two third (66.67%) of the respondents had operational land holding of 40 to 70 acres.

It could be inferred from the above studies that majority of farmers were in middle age group with the highest qualification of matriculation only and only few of the farmers were illiterate. A good number of studies showed that farmers had medium size of operational land holding, low to medium mass media exposure and medium to low scientific orientation.

2.2 Opinion of the farmers

Venkaria*et al.* (1993) observed that majority of the farmers (91.81%) had favourable attitude towards modern agricultural technology followed by 5.39 and 3.43 per cent who had unfavourable and neutral attitude, respectively.

Singh (1997) found that Majority of the respondents(81.33 per cent) had favourable attitude towards value addition of their farm produce whereas only 2.67 per cent of the respondents had unfavourable attitude towards value addition.

Rathore (2000) found that majority of beneficiaries (73.52%) had favourable attitude while 13.55 per cent beneficiaries had most favourable attitude and 12.75 per cent beneficiaries possessed least favourable attitude towards the dairy and livestock enterprises of SGSY programme (Swarn Jayanti Swarojgar Yojana).

Sharma *et al* (2001) conducted a study on functioning of milk cooperatives in Ludhiana district of Punjab and studied opinion of the beneficiaries regarding services and supplies provided by the milk cooperatives and revealed that majority of the respondents were satisfied with fat testing procedures, supply of ghee and artificial insemination while there was lot of scope of improvement in functioning of dairy cooperatives related to payment procedure, supply of fodder seeds and animal health care.

Meena *et al* (2009) studied that farmers had positive attitude towards post-harvest issues of horticultural crops i.e. environmental, technological and economic aspects. This shows the clear mind setup of farmers towards the post-harvest issues. The attitude of farmers can be more favourable if they are equipped with the knowledge on diversification, proper selection of appropriate technologies and financial assistance to gain more return with minimum risk.

Cavane (2011) found that farmers held positive attitudes towards improved maize and fertilizers. Farmers who learned from extension had stronger positive attitudes than farmers who learned about fertilizers from neighbors. These results indicate that, farmers do support the use of improved maize and chemical fertilizers.

It can be inferred from the above studies that farmers had favourable opinion towards modern agricultural technology. The attitude of the farmers can be made more favourable if they are made aware about diversification in agriculture.

2.3 Relationship between selected variables

Singh (1994) found that education of the fruit growers was negatively and significantly correlated with their training needs.

Sharma and Riyarudin (1995) observed that age of sheep farmers was positively and significantly correlated with the training needs of nutrition, breeding, and fodder production

areas but the age was negatively and significantly correlated with health care practices, management and better wool production areas of training need.

Singh (1997) reported that age of farmers was positively and non-significantly correlated with the training needs of farmers about the cotton wheat rotation.

Hakim (1998) found a significant and positive relationship between education and adoption of recommended practices for muskmelon cultivation.

Singh (1999) found that mass media exposure was negatively and significantly correlated with the training needs of vegetable growers.

2.4 Problems faced by the farmers.

Barwale (1985) examined the problems faced by private seed industry and attributed it to the following reasons: lack of availability of quality breeder and foundation seeds in required amounts, marketing problems, financing problems, non-availability of quality processing equipments and lack of clear cut policies. There was also an unsteady and varying supply of quality seed.

Roy (1985) examined constraints faced in the production of quality seed in India. He observed that poor land development for seed production was the major problem.

Sikder (1985) examined the marketing quality of seed in India. He observed that the major problem was lack of scientific organization with national and state level seeds corporations in public sector. There was also lack of suitable sales promotion activities. Seed had a limited shelf life, as a result of which corporations were reluctant to deal with them. The short term loans given by Ministry of Agriculture for purchasing inputs were rarely used for purchasing seed.

Btaoile and Thorat (1987) concluded that lack of credit and finance for purchase of costly inputs, restricted adoption of recommended practices in different crops.

Thakur (1987) pointed out the lack of supply of critical inputs, weed control, thinning of blossoms, control of diseases and attack of insect-pests were the main problems in the production of horticultural crops. He further reported that private trade which is handling as much as 85 per cent of the produce were charging many unauthorized charges from the producers and not making the payment in time. All the producers were not in a position to spend from their own source for arranging the marketing inputs e.g. labour for picking, assembling, grading, packing and transportation etc.

Trehan (1987) reported that beekeeping was also popular with servicemen and businessmen along with the farmers. He found that many respondents were dissatisfied with this profession due to marketing problem.

Dhesi (1988) narrated that though area under fruits and vegetables had increased considerably but the problem of marketing still existed.

Ramamurthy (1988) studied the working of the seed industry in India and observed that the major portion of seed produced was by the public sector. He further concluded that farmers were liable to break their contracts and sell outside if they get better prices and thus the public organizations were unable to achieve their target.

Gupta and De (1989) investigated various technical, infrastructural, economic, socio-cultural and educational constraints perceived by adopters and non-adopters in rearing cross-bred cows. The study was conducted in Sambhar Lake panchayat of Jaipur district, Rajasthan. A random sample of 15 villages was first selected. Of the 1989 families in these villages, 287 were adopters and 1702 non-adopters of cross-bred cows. From these households, a sample of 75 adopters and 75 non-adopters was selected for the study. It was found that there was a significant difference in the perceived institutional constraints between adopters and non-adopters. The problem of nepotism and favoritism in providing loans for rearing cross-bred cows was ranked as a more serious constraint by non-adopters than adopters. There was, however, no significant difference in the perception of the two groups regarding technical, socio-cultural and educational constraints.

Kaur *et al* (1989) listed the problems faced by the farmers in bringing about the diversification in agriculture as, marketing of produce (39.68%), labor shortage (25.46%), lack of technical advice (17.46%), lack of knowledge (15.87%), non-availability of pesticides and credit facilities (6.35%), non-availability of fertilizers (3. 1 7%) and assured price (4.76%).

Narang *et al* (1989) reported that procurement, shortage and marketing were the problems which were acting as a disincentive to the oil seed growers. Risk factor was also a major problem. High cost of fertilizers, chemicals for plant protection and lack of funds were the other problems.

Singh (1989) observed that high prices and yield fluctuations, high resource requirement and lack of technical skill were the problems faced by the vegetable growers.

Srivastava *et al* (1989) found that there were three major constraints i.e. timely and lack of adequate supply of improved seeds, recurrence of floods and also occasional droughts situation and lastly insect pest and disease attack. Majority of the farmers in all the farm categories reported occurrence of insect pests and disease attack as major constraint. Farmers quoted that except few improved varieties; no other high yielding varieties have been evolved suiting the agro climatic and environmental conditions of the area. Even the seeds

of already improved varieties as quoted by large and very large farmers were not available on time and in adequate quantity. Only 1/3rd of the total respondents and majority in large and very large farmer categories reported floods, as well as occasional drought situation as constraints.

Umesh and Bisaliah (1989) found that among the biophysical factors variety, seed treatment, time of sowing and method of sowing, spacing, plant nutrients, diseases and pest irrigation constrained higher productivity. Besides socio economic characteristics, inputs non availability and their cost, crop output, credit, marketing, technical guidance and its accessibility and feasibility had equal effect on all the farm group performance. These were the important factors which acted as constraints in the adoption of new technology and input use.

Aggarwal and Gossawi (1990) studied and analyzed the factors constraining the development of sugarcane sector in Uttar Pradesh. The major problems faced by the growers were non-availability of adequate credit, defect in method of price fixation, time gap between the harvesting and crushing of sugarcane adversely affecting the sugar recovery, thus effecting the sugarcane production and marketing.

Burch *et al* (1990) reported the constraints due to contract farming that the farm families were marginal and farmers loose power by dependence upon processing companies for inputs and know-how.

Chander *et al* (1990) found that ignorance about improved cultivars and cultivation practices was the most severe problem faced by the potato growers. They lacked knowledge, information regarding time and number of irrigation, weight and size of seed tubers, scientific method of sowing, number of ploughing given for field preparation method, quality and type of fertilizers for potato, doses and method of application of chemicals and scientific method of storage of potato. Other important constraints faced by the farmers were lack of assured irrigation and guidance for marketing of potato.

Kaur (1990) found the problems of Punjab farmers with respect to diversification in farming in districts of Ludhiana, Sangrur and Ropar and revealed that majority of farmers stated that lack of marketing facility, non-surety of yield and lack of support price for other crops were the problems faced by them for diversification in farming.

Ramachandran and Sripal (1990) reported that high cost of cultivation, lack of knowledge about method of seed treatment are the main constraints in the adoption of dryland technology for rainfed cotton.

Shih *et al* (1990) reported that the constraints on the development of floriculture industry are lack of capital, lack of facilities which led to high production cost, unstable production, low quality and lack of an open auction system which limits the marketing.

Singh *et al* (1990) concluded that seed industry faced a number of constraints in development like finance, risk involved, difficult seed research, small operations etc.

Bisen *et al* (1991) reported that high cost of fertilizer, lack of credit facilities, non-availability of skilled labour, difficulty in procuring spraying equipments and ignorance regarding suitable dose and method of application of fertilizers were the main constraints in adoption of recommended paddy cultivation practices.

Lakhera and Punjabi (1991) reported that lack of technical guidance regarding pre-harvest practices was being perceived by the farmers as an important constraint.

Vidyasagar (1991) noted that availability of quality seed was one of the major problems in vegetable production throughout the country.

Hedge (1992) revealed that constraints in the development of floriculture industry were lack of scientific information on flower growing for cut flowers or non-availability of good quality seeds and planting material.

Puranik *et al* (1992) reported major constraints to adoption included the heavy initial expenditure required for installation of the system, the lack of technical knowledge support, the lack of availability of subsidies and loans, and the cost and time involved in maintenance of the system. Those farmers that had adopted the system identified the major problems as: meeting the installation cost, the frequent clogging of mains and sub-mains, finding the time to attend to minor repairs, the lack of cheap locally available spare parts and the low quality of service by dealers. It was suggested that extension agencies, concerned departments and drip manufacturers must all concentrate on alleviating these constraints and problems by making subsidies, technical know-how, spare parts and prompt service more accessible.

Singh and Laharia (1992) reported that complexity of technology with the high cost and risky nature was the main constraints in adoption of sugarcane technology.

Randhawa (1993) examined the constraints in seed programmes in India. He reported that resource constraints i.e. lack of good farms, limited capacity to collect, conserve, evaluate, classify, catalogue and exploit available germplasm etc. were the major lacuna of India's seed programme.

Srivastava (1993) reported that the main reason for the low productivity of vegetable crops was the non-availability of quality tested and high yielding variety seeds.

Bansal (1994) observed that poor post-harvest management, inadequate cold storage, under developed market infrastructure, inadequate market information services, low level of

productivity and fragmented holdings are the main constraints in the export of horticultural products.

Pandey and Chaturvedi (1994) studied the problems in export of floriculture products as inadequate post-harvest technology, limited germplasm, non-availability and unfavourable air freight costs and European Union import taxes relative to some competitor countries.

Somani and Lodha (1994) conducted a study on farmer's problems in judicious use of fertilizers in Udaipur and revealed that high cost of fertilizers was the most important problem followed by lack of irrigation facility credit facility, low price of produce and non-availability of fertilizers.

Dolli *et al* (1995) reported that lack of knowledge was the main reason for non-adoption/partial adoption of cultivation practices of pulse crop. It was further reported that high cost of seed and its non-availability at right time were the other reasons for non-adoption.

Hossain *et al* (1995) conducted a study on extent of adoption and constraints in the diffusion of farm and allied technology in Balasore district of Orissa and reported that non-availability and untimely supply of inputs and traditional attitude of farmers and the sharp rise of farm input obstructed technical process.

Pawar and Kadam (1995) revealed that the major constraints faced by agro forestry growers were the shortage of seedlings, non-cooperation from government officials and uneconomical transport facilities and high mortality rate of seedlings of teak.

Salunkhe *et al* (1995) reported that the lack of awareness was the main constraint for the low adoption of important farm implements in Ahmadnagar district of Maharashtra.

Singh and Prasad (1995) reported that the lack of marketing facilities and lack of knowledge were the main constraints in adoption of Rajmash production technology.

Shende and Phadke (1995) studied that deforestation, indiscriminate use of pesticide, pollution, and monoculture was manmade problems, which affected the development of the beekeeping industry.

Sund (1995) reported that price paid for processed products by the wholesalers was less than retailers and consumer’s purchase price. Seasonal production and perishable nature of vegetables, costly and inadequate cold storage facilities, lack of funds, costly packing material and inadequate skilled labour were major problems faced in processing.

Gill (1996) found that lack of knowledge was the major reason for non-adoption of almost all practices by majority of the litchi growers. Other reasons were financial problem, shortage of labour and soil condition.

Sharma (1996) reported that lack of knowledge, financial problems, high cost of inputs, non-availability of inputs, lack of transport and storage facilities were the main constraints faced by mango growers in the adoption of recommended practices for mango cultivation in Punjab.

Suraj (1996) found that the lack of knowledge, traditional attitude, labour problem, high cost of fertilizers and pesticide and wrong advice by pesticide dealers and neighbours were the main bottlenecks in adoption of the recommended practices for pear cultivation.

Sutar *et al* (1997) reported that major constraints in adoption of scientific technology in grape cultivation were high cost involved in cultivation of required varieties, non-availability of improved varieties, lack of credit facilities.

Hakim (1998) reported that main constraints faced by muskmelon growers were high costs of inputs, lack of technical knowledge, high intensity of diseases and pests, low remunerative price, no standard weighing procedure, heavy price fluctuations, no support price and exploitation by commission agents.

Singh (1998) reported that lack of knowledge, costly labor, high cost of inputs, traditional attitude and personal experience were main constraints in adoption of recommended practices for potato cultivation with respect to recommended varieties, fertilizer application, fungicide application, seed rate and row to row distance.

Kaur (1999) concluded that intensive labor and lack of training in flower seed production were the major problems faced by the farmers. Lack of awareness among farmers and delaying seed export due to non-cleaning of seed by farmers were the problems faced by all the contracting agencies.

Singh (1999) reported that problems faced by loanees in credit procurement were bribery, excessive visits, lengthy procurement procedure, difficulty in obtaining documents etc. Major problems faced by the non-loanees were lack of knowledge about loan procurement, difficulty in obtaining documents, and lengthy procurement procedure.

Ismael *et al* (2000) described the results of research conducted on 100 randomly selected smallholder farmers in the Makhathini region, Kwazulu Natal, Republic of South Africa, designed to explore the economic benefits of the adoption of Bt cotton for smallholders. Results suggest that Bt cotton had higher yields than non-Bt varieties and generated greater revenue. Seed costs for BT cotton were double then those of non-Bt, although pesticide costs were lower. On balance, the gross margins (revenue minus costs) of Bt growers were higher than those of non-BT growers.

Paul *et al* (2001) revealed that lack of proper knowledge of composting, losses on account of perishable nature of mushrooms, difficulty in borrowing loans, lack of storage facilities were major constraints confronted by the selected mushrooms cultivators.

Sagar (2001) observed that large mushrooms growers faced problems like lack of good quality spawn, uncertainty in price of mushrooms, lack of common facility for storage of fresh mushrooms, non-availability of requisite inputs, complex process of obtaining loan/finance, lack of low cost mushrooms farm design and lack of training facilities.

Sharma (2001) reported that intensive labor, attack of insect-pest and transportation cost were the problems faced by the respondents. Lack of contract farming awareness among farmers and break down of agreement were the major problems faced by all the contracting agencies.

Sharma and Singh (2001) reported economic constraints such as non-availability of credit by financial institutions when needed, high cost of insecticides and fungicides and high cost of crop cultivation in adoption of technology.

Chawla (2002) observed that contract farming has some inherent obstacles. One of the main constraints in this model was the absence of laws to govern the contracts. In short term crops, farmers might be tempted to sell off their produce if the market price was more than the promised one in the contract. In the long term plantation crops the companies might fail to honour the contract and paid the farmers less than originally promised. Another constraint was that though the risk was allocated between the farmers and the company, it was usually the farmers who get a raw deal due to lack of knowledge and unavailability of alternatives.

Gagandeep (2002) found that majority of wheat growers faced various constraints i.e. high cost of inputs like fungicides, weedicides and insecticides, lack of knowledge, labor intensive nature of weedicides and non-credibility of the advice given by dealers.

George and Singh (2002) found lack of awareness regarding recommended improved practices of vegetable cultivation and non-adoption of improved farm practices as the major reason for low yield per acre.

Johagirdar *et al* (2002) reported that the main reasons for non-adoption of recommended practices of tomato cultivation were lack of knowledge for practices like seed rate, application of fertilizer application as basal dose and top dressing, nursery management practices like type of seed bed and application of farmyard manure, chemical fertilizer and plant protection measures.

Josan (2002) found that all the pea growers had the problem of no fixed price of pea whereas 75 per cent of the pea growers reported sharp decline in yield of pea crop. About 62

per cent of the pea growers had reported the problem of lack of technical knowledge and costly seed. Non-availability of pure seed was the problem faced by 56.57 per cent of pea growers. Nearly equal percentage of pea growers i.e. 21.05 per cent and 19.74 per cent had the problem regarding lengthy and complicated procedure for getting loan and non-availability of recommended pesticides respectively.

Kaur (2002) reported that marketing of seed, non-availability of expert labor and attack of insects pests and diseases as the major problems faced by the vegetable seed growers and observed high training need in area of plant protection measures.

Khangura (2002) observed that pea growers of Ludhiana district of Punjab faced the problems of more fluctuation in the market regarding the price of inputs, high costs of labor and lack of knowledge regarding the dose of pesticides.

Kumar *et al* (2002) studied regulation of markets in Haryana. They had found that most of the farmers were not aware about different type of marketing charges. Moreover, adequate information regarding prices of different commodities was not properly disseminated to farmers. Regular supervision by market officials was not done to safeguard the interest of the farmers.

Kumar and Singh (2002) studied the problems of vegetable production in Bharatpur district of Rajasthan and reported that the vegetable growers faced the problems such as non-availability of inputs at right time, poor and insufficient quality of inputs, non-availability of desired tomato varieties in the market, high cost of inputs, lack of knowledge about the correct method of their use and non-availability of subsidy. They further pointed out that these problems discouraged the vegetable growers to give boost to vegetable farming.

Malik *et al* (2002) obtained the constraints in the adoption of sunflower production technology as perceived by farmers and listed them as high cost of inputs, non-availability of quality seeds, fertilizers, weedicides, insecticides etc. at required time, unfavorable weather condition, low support price, lack of cooperative organization for marketing of produce.

Meena and Chauhan (2002) stated that constraints perceived by the farmers in adoption of improved production practices of groundnut were related to seed treatment, weed management, plant protection measures, post-harvest technology and storage.

Patil *et al* (2002) suggested that market information and weather updates were of prime interest to Indian farmers. Illiteracy, cost and lack of awareness were the major adoption constraints. Human capital enhancement was understood to be the main remedial measure to improve the low rate of ICT adoption.

Kaur and Khurana (2003) conducted a study in Ludhiana and Hoshiarpur district of Punjab related to factors affecting and problems faced by the members of Milk Producer Co-operative Societies of Milkfed and reported that lack of artificial insemination facilities (52 per cent) was identified as most important problem faced by the members. Malpractices in calculating the actual fat, delayed payment for milk, lack of supply of fodder seeds and technical dairy information were other problems.

Nirmala (2003) reported that organic farmers faced additional cost of more labor, intensive weeding practices, more expensive natural fertilizers and the higher degree of crop loss occurred when no chemical pesticides were used.

Singhal *et al* (2003) reported that various reasons for the problem of unpopularity of biofertilizers were lack of education, lack of proper manufacturing and distribution channels and deficiency of quality of guarantee products. Besides being nontoxic and cheaper, biofertilizer could provide employment to large number of graduates, if they were given a short training.

Vasava and Pandya (2003) studied the extension strategy for overcoming the major problems of mango and tomato growers of tribal and non-tribal area of South Gujarat. They reported that the growers faced problems of high price of farm yard manure (F.Y.M.) and chemical fertilizers, lack of storage facilities, lack of processing units, lack of knowledge about storage and processing, lack of road facility at village level, low price of produce, problem of middlemen and quick deterioration of produce.

Kumar (2005) reported that in contract farming main problems faced by the respondents were the strict grading practices, non-marketing of the produce, non-remunerative prices and late payment.

Navadker *et al* (2005) reported high cost of package material, commission charges and high cost of transportation along with absence of timely payment and malpractices adopted in market as major constraints faced by the vegetable growers in marketing of their produce.

Thyagarajan and Prabu (2005) reported that wide price fluctuation, lack of knowledge to identify pests and disease, high cost of labor, inadequate water supply, non-availability of credit, exploitation by the middleman by charging heavy rate of commission and brokerage, lack of adequate transport and market facilities and lack of storage facilities were the problems faced by the tomato growers.

Birthal *et al* (2006) reported that up scaling of high value agriculture was constrained by lack of infrastructure for production, marketing and processing.

Joshi *et al* (2006) concluded that production and market risk are in high value crops because most of these crops require more capital, quality inputs, improved technologies and better information. The small holders often lack access to these and do not diversify into high value crops.

Nakro and Khiki (2006) found that lack of transport infrastructure increases the cost of transportation of the produce and acquisition of inputs. They estimated the transportation cost of fruit and vegetable crops to be 18-28 per cent of the total input cost, which was quite high.

Reddy *et al* (2007) stated five major constraints in utilization of veterinary services as perceived by majority of the farmers. These were lack of sufficient supply of drugs at the veterinary hospitals (100%), absence of efficient diagnostic laboratories in rural areas (94.17%), inadequate budget allotment for the provision of veterinary services (92.5%), non-availability of round the clock services (91.67%) and lack of sufficient infrastructure facilities for treating the surgical cases (90.83%).

Temkar and Chinchmalatpure (2007) studied the problems in adoption of recommended paddy cultivation technology. They stated that the major constraints faced by the trained and untrained farmers were non availability of labor at the time of transplanting, non-availability of inputs in time, high cost of labor, low price of produce and complicated methods of spraying of chemicals.

Kumar (2008) studied the status of protected cultivation of vegetables by the farmers of Punjab and reported that cumbersome and lengthy loan procedure was the major problem in under taking protected cultivation of vegetables. Difficulty in getting subsidy and non-availability of insurance cover for protected cultivation were also the problems behind under taking protected cultivation of vegetables.

Yasmin (2009) reported that in organic farming scarcity of labor was the most serious problem whereas small size of land holdings as well as non-availability of organic manure in sufficient quantity were least encountered problems as reported by majority of the respondents.

From the proceeding review of literatures, it could be concluded that major constraints reported in the adoption of new technology were high cost of the technology, lack of credit and finance and lack of technical guidance. Another main constraint which came up in most of studies was lack of awareness about the new technology.

Chapter-III

MATERIALS AND METHODS

The quality of any research is judged on the basis of its methodological approach. It provides guidelines to the researcher to conduct the research study systematically. Technical programme of any research is largely dependent on the procedure followed in conducting the investigation and the findings that emanate from it. Keeping this in view, a thorough study of the available relevant literature was made in order to develop the research methodology to be followed for the present study.

The research methodology followed for conducting the present study has been given under the following heads and sub heads:

3.1 Locale of the study

3.2 Selection of the respondents

3.3 Selection of the variables

3.4 Operational definitions

3.5 Construction of research instrument

3.6 Pretesting of research instrument

3.7 Collection of data

3.8 Statistical Analysis of data

3.1 Locale of the study

The study was conducted in Ludhiana district of Punjab.

3.2 Selection of the respondents

A list of vegetable growers who were cultivating Potato, Chilli and Tomato on their farms was collected from the office of State Department of Horticulture, Ludhiana. From that list, a sample of 80 farmers was taken by using Probability Proportionate to number of farmers growing the selected crops viz potato, chilli and tomato.

3.3 Selection of the variables

The following variables were selected for this study:

3.3.1 Age

3.3.2 Education

3.3.3 Family Type

3.3.4 Family size

3.3.5 Operational land holding

3.3.6 Experience in vegetable cultivation

3.3.7 Annual Income

3.3.8 Extension Contacts

3.3.9 Mass media Exposure

3.3.10 Innovativeness

3.3.11 Scientific Orientation

3.3.12 Economic Motivation

3.3.13 Risk bearing capacity

3.3.14 Opinion

3.3.15 Problem

3.4 Operational definitions

3.4.1 Age

It refered to the chronological age of the respondents in terms of completed years of life at the time of data collection. Based on this criterion, the respondents were categorized into following three categories by using cumulative frequency cube root method:

Young	25-38
Middle	38-50
Old	50-64

3.4.2 Education

It refered to the level of formal school education of the respondents in terms of years he/she had attended the School/ College successfully. Education was categorized as follows:

Primary

Middle

Matric

Senior Secondary

Graduate

Post graduate

3.4.3 Family Type

It refered to the type of family to which the vegetable grower belonged i.e. nuclear or joint. Nuclear family means the family of husband, wife and children living together and joint family means family of husband, wife, their children and parents living together.

3.4.4 Family size

It refered to number of members in the family of the vegetable grower sharing the same kitchen. Respondents were classified into two categories as follows:

Category	**Number of members**
Small	Upto 5
Large	> 5

3.4.5 Operational land holding

It referred to total area in acres put under crop cultivation by the respondent at the time of data collection. It was calculated as:

Operational land holding = Land owned + Land leased in – Land leased out.

The respondents were classified into following five categories according to statistical abstract of Punjab (2006).

Category	Operational Land Holding
Marginal	< 2.5 acres
Small	2.5-5 acres
Semi-medium	5-10 acres
Medium	10-25 acres
Large	> 25 acres

3.4.6 Experience in Vegetable Cultivation

It refered to number of years for which the respondent had been cultivating vegetables on his farm.

It has been categorized into following three categories by using range method:

Experience in Vegetable Cultivation (years)

2-9 years

9-16 years

16-23 years

3.4.7 Annual Income

It refered to the total annual earnings from salary, agriculture land, rent or any other sources for the individual respondent. It has been categorized into four categories by using range method.

Income (in lacs /annum)

2-4.5

4.5-7

7-9.5

Above 9.5

3.4.8 Extension Contact

It refered to the frequency of contact made by the respondent with different extension agencies for seeking information related to processing of vegetables. It was studied on a three point continuum such as Always, Sometimes and Never by assigning score of 2, 1

and 0 respectively. Based on the scores obtained by the respondents, they were classified by using range method as follows:

Extension Contacts	Score
Low	0-3
Medium	3-6
High	6-9

3.4.9 Mass Media Exposure

It refered to the frequency of using different media viz Radio, Television, Farm Literature and newspaper by the vegetable grower to gain or improve knowledge about processing of vegetables. Mass media used by the respondents was studied on a three point continuum such as Always, Some times and Never by assigning the score of 2, 1 and 0 respectively. Based on the scores obtained by the respondents, they were classified by using range method as follows:

Mass Media Exposure	Score
Low	0-5
Medium	5-10
High	10-15

3.4.10 Innovativeness

It refered to the degree to which an individual is earlier in adopting new technology/ vegetable processing than other members of the social system**.** It was studied by using modified scale of Singh(1972) on a three point continuum such as Agree (2), undecided (1) and disagree (0). Reverse scoring system was employed for the negative statements. Based on the scores obtained by the respondents, they were classified by using range method as follows:

Innovativeness	Score
Low	4-8
Medium	8-12
High	12-16

3.4.11 Scientific Orientation

It refered to the degree to which a vegetable grower uses scientific approach. It was studied with modified scale of Supe and Singh(1976) on a three point continuum such as agree (2), undecided (1) and disagree(0). Reverse scoring system was employed for the negative statements. Based on the scores obtained by the respondents they were classified by using range method as follows:

Scientific orientation	Score
Low	1-4
Medium	4-7
High	7-10

3.4.12 Economic Motivation

It refered to the degree to which a vegetable grower is desirous to increase farm income and maximize his profit. It was measured in terms of total score obtained by the respondents on modified scale developed by Supe (1969). It was studied on a three point continuum i.e. Agree (2), Undecided (1) and Disagree (0).

Reverse scoring system was employed for the negative statements. Based on the scores obtained by the respondents they were classified by using range method as follows:

Economic Motivation	Score
Low	4-8
Medium	8-12
High	12-16

3.4.13 Risk bearing capacity

It refered to the degree to which an individual is oriented towards risk and uncertainty and has the courage to face the problems emerging time to time while starting an enterprise. It was studied using modified scale of Supe and Singh (1976) on a three point continuum such as Agree, Undecided and Disagree with assigned score of 2, 1 and 0 respectively. Reverse scoring system was employed for the negative statements.

Based on the scores obtained by the respondents they were classified by using range method as follows:

Risk bearing capacity	Score
Low	4-8
Medium	8-12
High	12-16

3.3.14 Opinion

It refered to the personal view of the vegetable grower regarding processing of vegetables. It was studied on two point continuum i.e. agree and disagree.

3.4.15 Problem

It refered to the constraints perceived by the vegetable growers in processing of vegetables. Problems were studied on three point continuum i.e. very serious, serious and not serious.

3.5 Construction of research instrument

An interview schedule was prepared which included the following parts.

Part 1

It dealt with socio-personal characteristics of the vegetable growers like age, family type, family size, education, operational land holding, area under vegetable cultivation, experience in vegetable cultivation, mass media exposure, risk bearing capacity, innovativeness, scientific orientation, economic motivation and extension contacts.

Part 2

It included statements/items to know the opinion of the vegetable growers about vegetable processing. The responses were taken on two point continuum i.e. Agree/ Dis-agree.

Part 3

It dealt with problems/constraints perceived by the vegetable growers in processing of vegetables. It was studied on a three point continuum i.e. Very serious, serious and not serious.

Part 4

It dealt with the suggestions of the respondents to overcome the problems perceived by them in processing of vegetables.

3.6 Pre-testing of research instrument

The interview schedule was pre-tested on 15 non-sampled vegetable growers. The changes suggested and observed as a result of pre-testing were incorporated in the interview schedule after discussing with the members of advisory committee.

3.7 Collection of Data

The data were collected from the respondents with the help of Interview Schedule. Proper precautions were taken to ensure unbiased response of the respondents by providing them necessary instructions after explaining the purpose of the study. The data were collected personally by the researcher by visiting the study area and interviewing the respondents.

3.8 Statistical analysis of the data

The responses of the respondents were transferred on the master-sheet and data were analysed with the help of appropriate statistical tools such as frequencies, percentage, mean score, range method, cumulative frequency cube root method and Chi square tests.

3.8.1 Frequency distribution of the respondents

Frequency was worked out by calculating the number of the respondents belonging to a particular response category.

3.8.2 Percentage

A percentage is a way of expressing a number as a fraction of 100 (*per cent* meaning "per hundred").

$$\frac{\text{Frequency}}{\text{Total number of respondents}} \times 100$$

3.8.3 Mean score

The arithmetic mean score of a set of data had to be often computed during the data analysis. The mean score was calculated by using the following formula

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

Where

$\bar{X}$= Mean score

Xi = Observed score

N = Total number of respondents

3.8.4 Range

Range method was employed to classify the respondents into different categories.

$$\frac{\text{Maximum limit} - \text{Minimum limit}}{\text{Number of categories to be made}}$$

3.8.5 Cumulative frequency cube root method

The cumulative frequency cube root method (Singh, 1975) was employed to classify the respondents into different categories with probability proportional to the number of them in each category.

$$S_i = L_i + \frac{(N/3 - cf_{i-1})}{f} \times h$$

Where,

$S_i = i^{th}$ segment (i = 1, 2, 3, 4….)

L_i= Lower limit of the class

cf_{i-1}= Cumulative frequency of the class preceding to the quartile class

f = Frequency for quartile class in the $\sqrt[3]{f}$ column

h = Width of the class or interval

N = Total of cube root of frequency

3.8.6 Chi-square test

The χ^2 test was used to test the association (or difference) between two variables in the form of nominal data of frequencies when the data were collected on nominal level.

$$\chi^2_{(r-1)(i-1)} = \sum_{j=i}^{k} \frac{\left(O_j - E_j\right)^2}{E_j}$$

Where,

χ^2= Chi-square test

$\sum$ = Summation

O_j = Observed frequencies for j^{th} cell

E_j = Expected frequencies for j^{th} cell

Chapter-IV

RESULTS AND DISCUSSION

This chapter deals with the results of the study which emerged as a result of analysis and interpretation of data. For better comprehension of the results, these have been presented under different sections. Every section gives a detailed account of the results of the study and presents an analytical view of the results by discussing its various dimensions and giving relevant references at the appropriate places in agreement or disagreement of the results. The results have been discussed under the following heads:

4.1 Socio-personal characteristics of the respondents
4.2 Opinion of vegetable growers about processing of vegetables
4.3 Relationship of socio-personal characteristics with willingness to go for processing of vegetables
4.4 Problems perceived by the vegetable growers in processing of vegetables
4.5 Suggestions given by the vegetable growers to overcome problems perceived by them in processing of vegetables

4.1 Socio-personal characteristics of the respondents

The data pertaining to the socio-personal characteristics of the respondents have been presented in Table 4.1 to Table 4.9. The details of characteristics such as age, education, family type, family size, operational land holding, experience in vegetable cultivation and income have been presented in Table 4.1

4.1.1 Age

The respondents were classified into three categories by using cumulative frequency cube root method and were categorized into young (25-38 years), middle (38-50 years) and old (50-64 years), as given in Table 4.1. More than half of the vegetable growers i.e. 52.50 per cent belonged to middle age group. It was also found that 28.75 per cent of vegetable growers belonged to young age followed by 18.75 percent who were belonging to old age group. It can be concluded that maximum number of the farmers were of the middle age group i.e. 38-50 years. Similar findings were reported by Gill (1998), Josan (2002) and Kaur (2002).

4.1.2 Education

Respondents were categorized into six categories based on their educational level. It is clear from the data in Table 4.1 that 43.75 per cent of the respondents were Matriculates and 20 per cent of the respondents had the educational level of senior secondary. About 12

per cent had educational level upto middle whereas 10 per cent had the educational level upto primary. About 10 per cent of the respondents were Graduates while less than four per cent of the respondents were post graduates.

Table 4.1: Distribution of the respondents according to their personal characteristics

S. No.	personal characteristics	Category range	Frequency(f)	Percentage (%)
1.	Age (years)	Young (25-38)	23	28.75
		Middle (38-50)	42	52.50
		Old (50- 64)	15	18.75
2.	Education	Primary	8	10.00
		Middle	10	12.50
		Matric	35	43.75
		Senior Secondary	16	20.00
		Graduate	8	10.00
		Post Graduate	3	03.75
3.	Family Type	Nuclear	49	61.25
		Joint	31	38.75
4.	Family size (No. of family members)	Upto 5	41	51.25
		>5	39	48.75
5.	Operational Land Holding (acres)	Marginal < 2.5	0	--
		Small 2.5-5	7	08.75
		Semi-medium 5-10	29	36.25
		Medium 10-25	31	38.75
		Large > 25	13	16.25
6.	Experience in Vegetable Cultivation (years)	2-9	19	23.75
		9-16	38	47.50
		16-23	23	28.75
7.	Annual income (lacs /annum)	2- 4.5	10	12.50
		4.5-7	35	43.75
		7-9.5	18	22.50
		Above 9.5	17	21.25

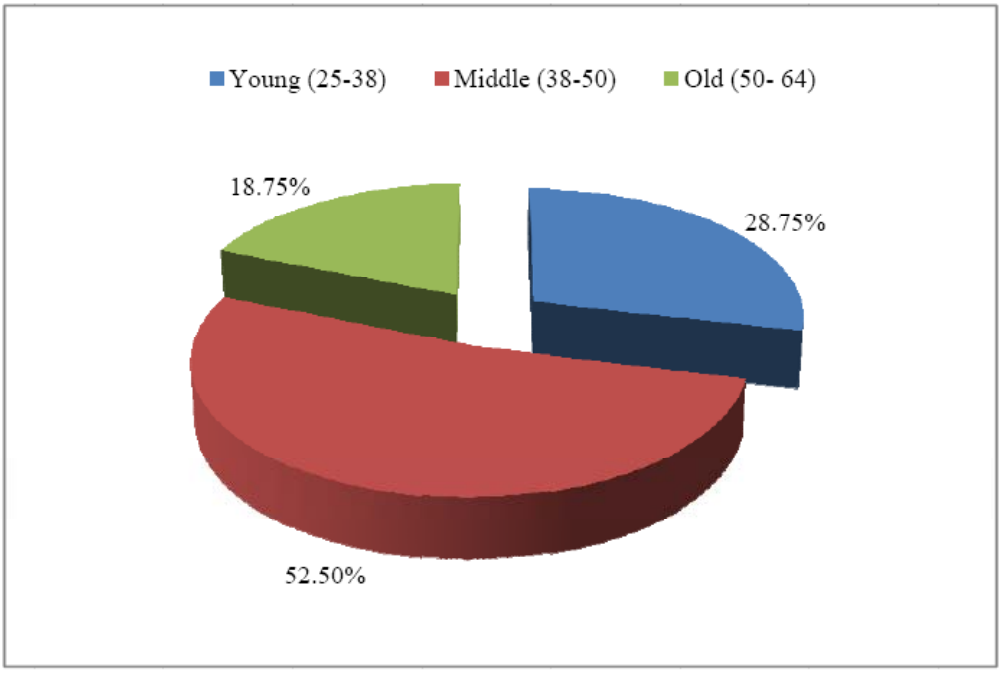

Fig. 1: Distribution of respondents on the basis of age

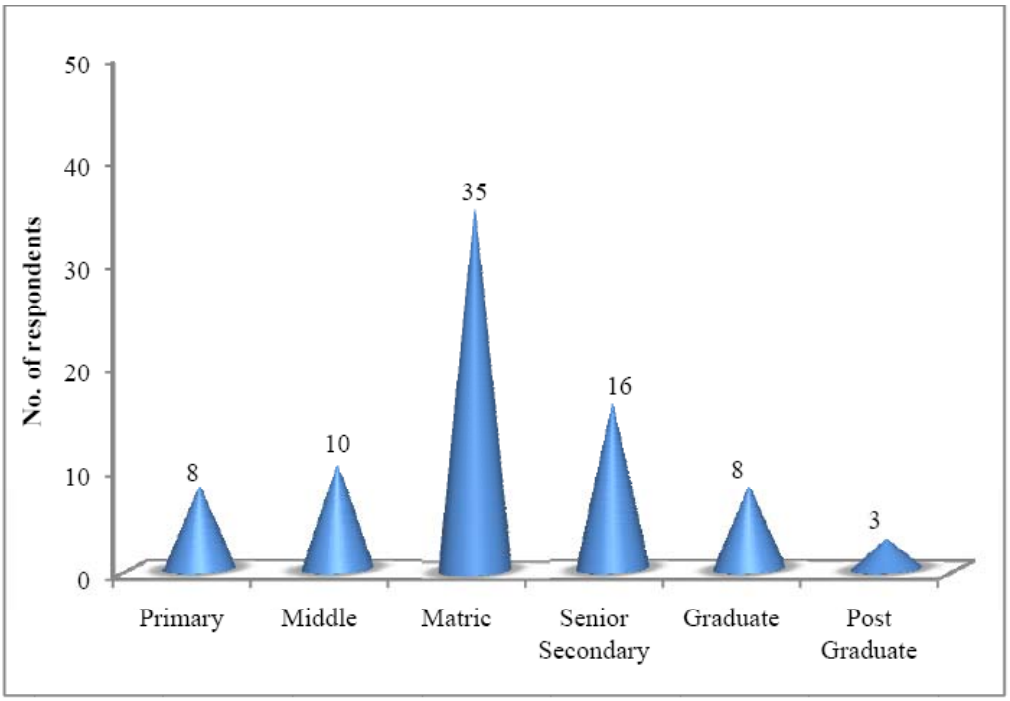

Fig. 2: Distribution of respondents on the basis of education

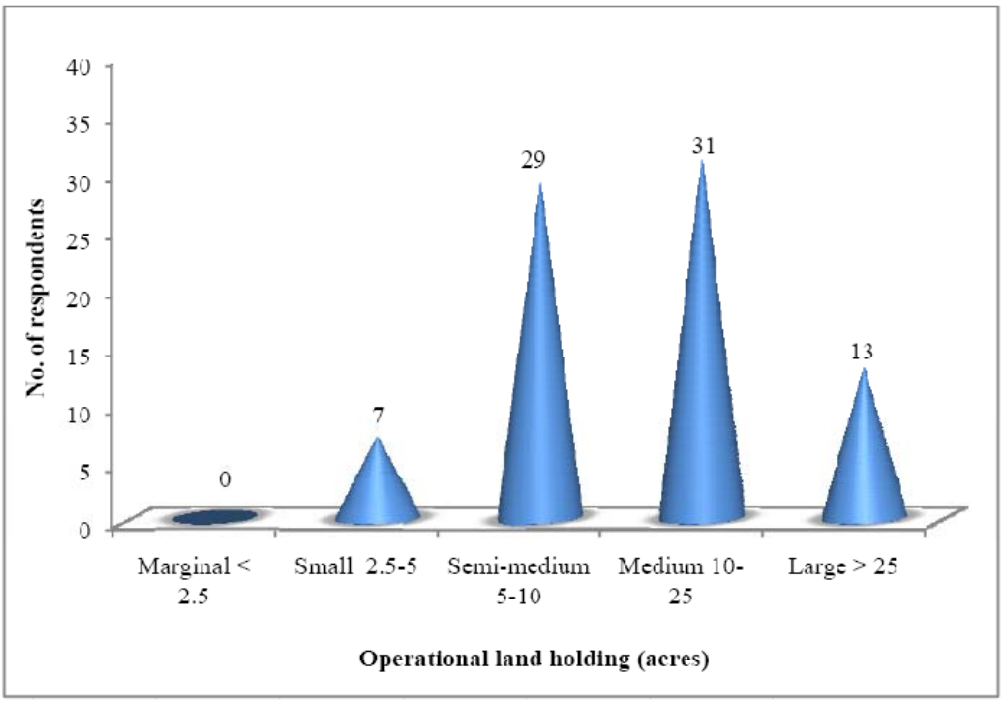

Fig. 3: Distribution of respondents on the basis of operational land holding

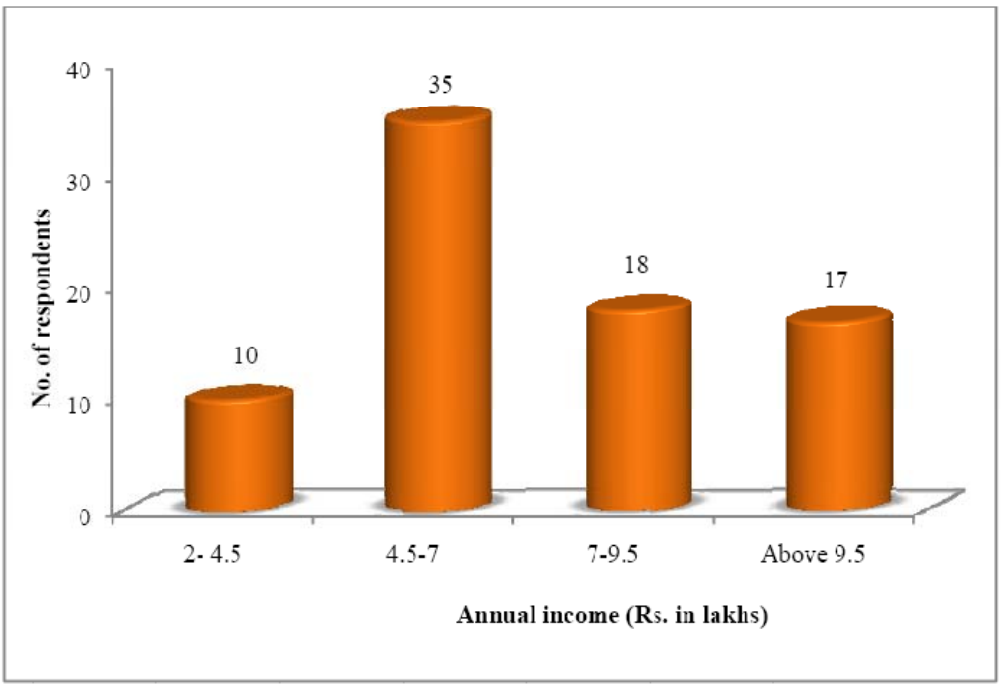

Fig. 4: Distribution of respondents on the basis of annual income (Rs. in Lakhs)

4.1.3 Family type

Family of the respondents was categorized into two categories nuclear or joint family. The data in the Table 4.1 further reveal that 61.25 per cent of the respondents were from nuclear families and 38.75 per cent of the respondents belonged to joint families. The trend is contrary to the belief that joint families do exist in rural areas.

4.1.4 Family size

Family size of the respondents was categorized into two categories having upto 5 and more than five members. The data given in Table 4.1 reveal that 51.25 per cent of the respondents had family members upto 5 whereas 48.75per cent of the respondents had more than five family members.

4.1.5 Operational land holding

Operational land holdings of the respondents were categorized into five categories by using statistical abstract of Punjab (2006). The study findings reveal that 38.75 per cent of the respondents had 10-25 acres of operational land holdings while 36.25 per cent of the respondents had operational land holdings of 5-10acres. About 16 per cent of the respondents had operational land holdings more than 25 acres whereas less than nine per cent of the respondents had operational land holdings between 2.5-5 acres. These findings are in line with the findings of Kumar (2005).

4.1.6 Experience in vegetable cultivation

Experience in vegetable cultivation indicates the depth of knowledge and also understanding about their cultivation. It is observed from Table 4.1 that a little less than half of the respondents (47.50 per cent) had experience between 9-16years while 28.75 per cent respondents had experience of 16-23 years in vegetable cultivation. A little less than one-fourth (23.75 per cent) of the respondents had experience of 2-9 years in vegetable cultivation.

4.1.7 Total Income

It refers to the total amount of rupees earned by the vegetable growers in a year. It plays an important role in the behavior of an individual. The respondents were divided into four categories using range method. As many as 43.75 per cent of the respondents were in the income group of Rs. 4.5-7 lacs and 22.50 per cent of the respondents were in the income group of Rs. 7-9.5lacs. About 21 per cent of the respondents belonged to income group of above Rs.9.5lacs whereas about 12.50 percent of the vegetable growers were in income group of Rs 2-4.5 lacs.

4.1.8 Extension Contacts

To update their knowledge about different aspects of vegetable cultivation the respondents had contact with different extension functionaries. Responses of the respondents were recorded on a three point continuum and have been presented in Table 4.2. It was observed that 45 percent of the respondents were having medium extension contacts followed by 41.25 percent of the respondents that had low extension contacts. Only 13.75 per cent of the respondents had high level of extension contacts. It can be concluded that most of the vegetable growers had medium to low extension contacts. These findings are in line with the findings of Chandergowda and Jayaramain (1990), Roy *et al* (1992) and Ranganatha *et al* (1993).

Table 4.2: Distribution of the respondents according to their extension contacts

Extension contacts	Frequency (f)	Percentage (%)
Low (0-3)	33	41.25
Medium (3-6)	36	45
High(6-9)	11	13.75

4.1.9 Mass Media Exposure

Responses of the respondents were recorded on three a point continuum. It is clear from the data in Table 4.3 that more than half of the respondents i.e. 61.25 per cent had medium mass media exposure whereas 21.25 percent of the respondents had high mass media exposure. Only 17.5 percent of the respondents had low mass media exposure. These findings are in consonance to Kaur (2002).

Table 4.3: Distribution of the respondents according to their Mass Media Exposure

Mass media exposure	Frequency (f)	Percentage (%)
Low (0-5)	14	17.50
Medium (5-10)	49	61.25
High (10-15)	17	21.25

4.1.10 Innovativeness

Responses of the respondents were recorded on three a point continuum and have been presented in Table 4.4. The data reveal that 58.75 percent of the respondents belonged to category that had medium degree of innovativeness. A little less than one-fourth (22.50 percent) of the respondents had high degree of innovativeness followed by 18.75 percent of respondents who had low degree of innovativeness. It can be concluded that most of the respondents were having medium to high degree of innovativeness.

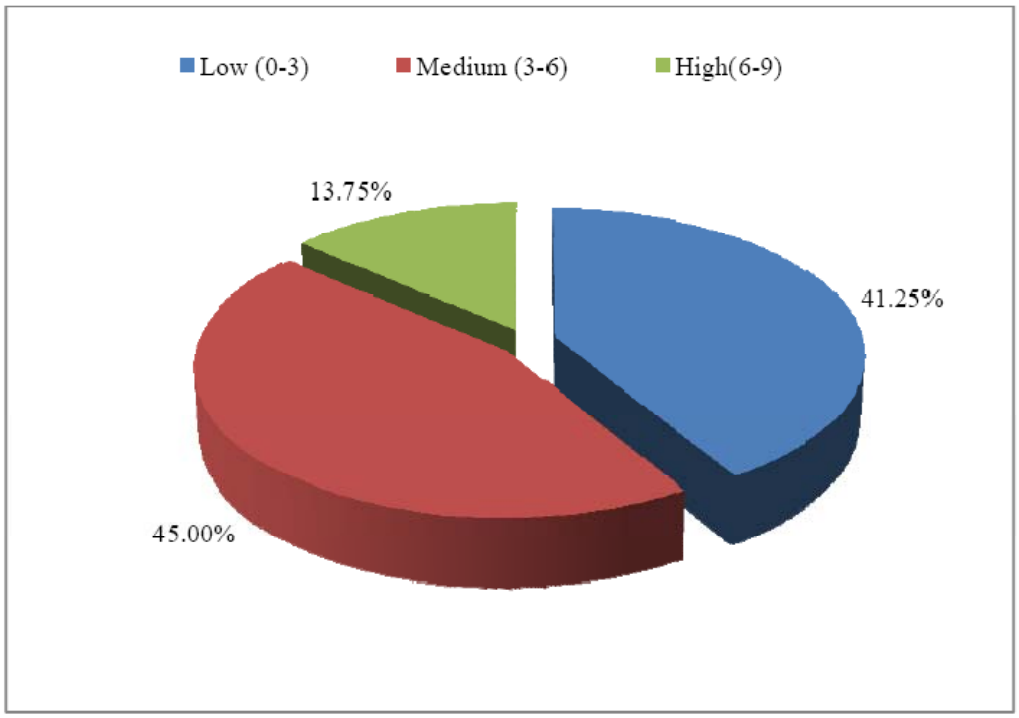

Fig. 5: Distribution of the respondents according to their extension contacts

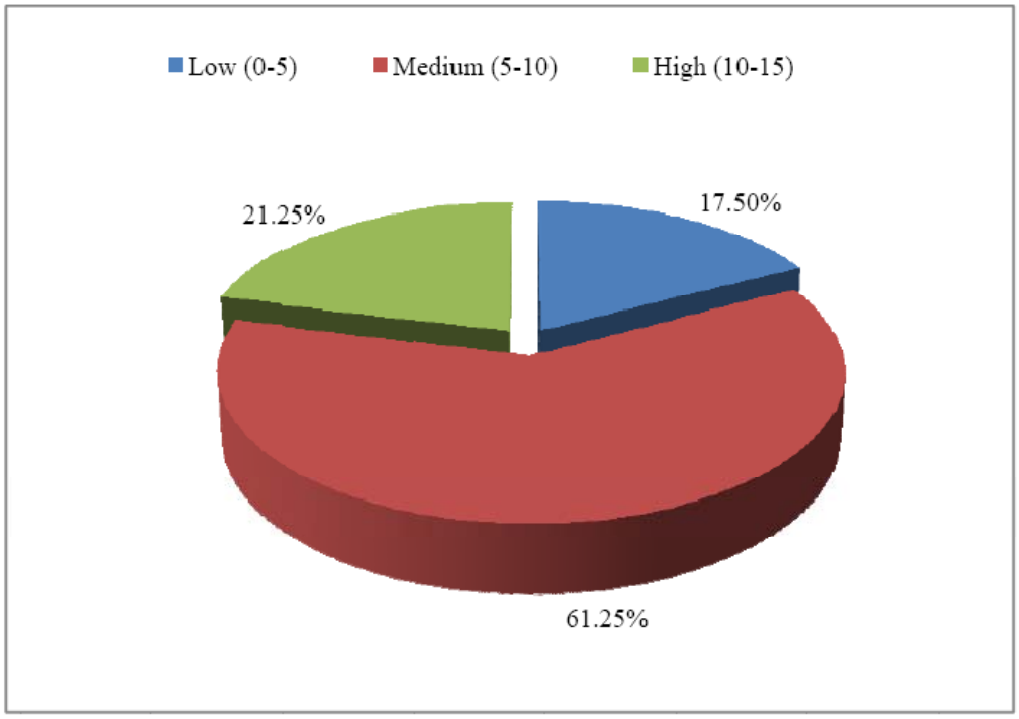

Fig. 6: Distribution of the respondents according to their mass media exposure

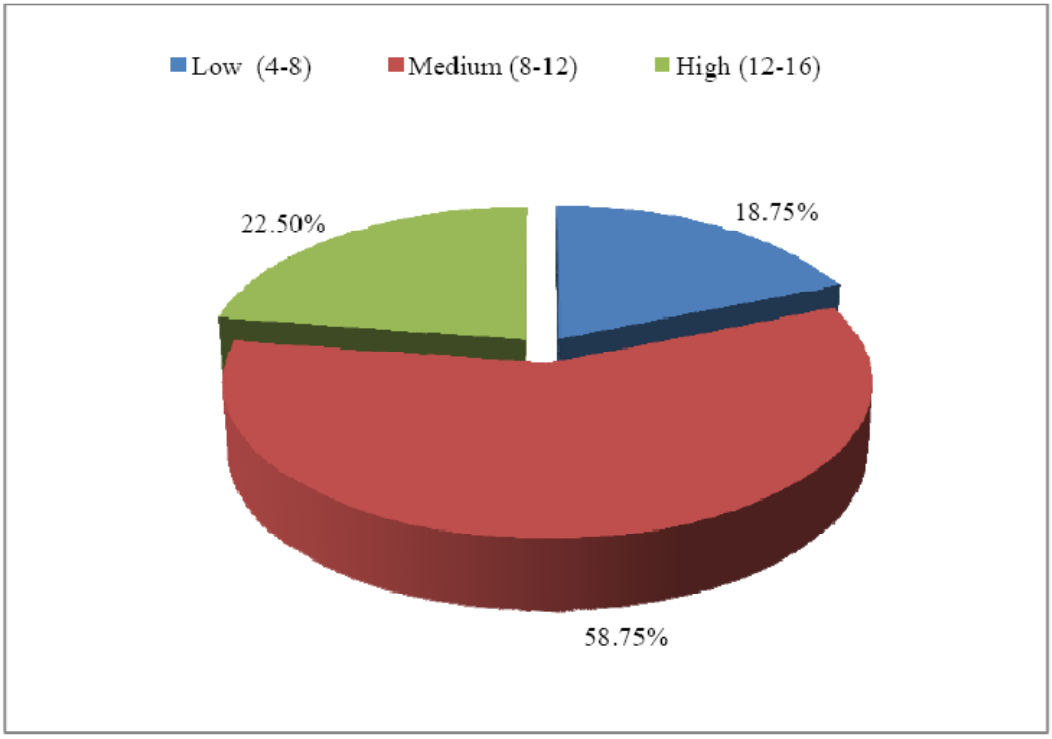

Fig. 7: Distribution of the respondents according to their innovativeness

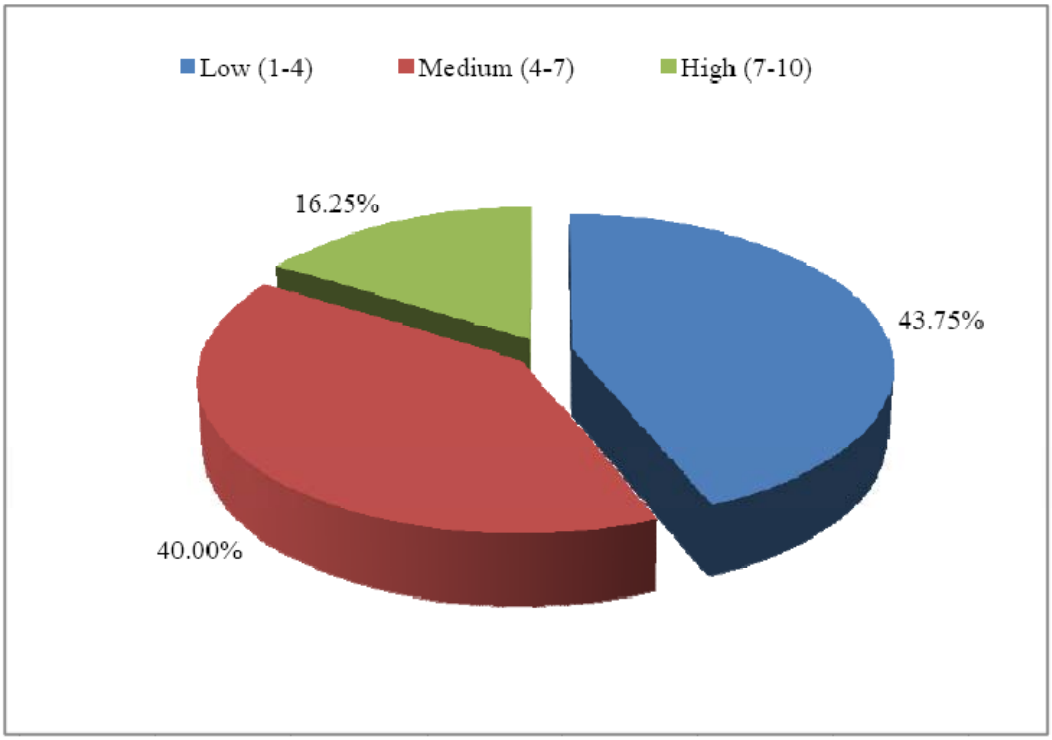

Fig. 8: Distribution of the respondents according to their scientific orientation

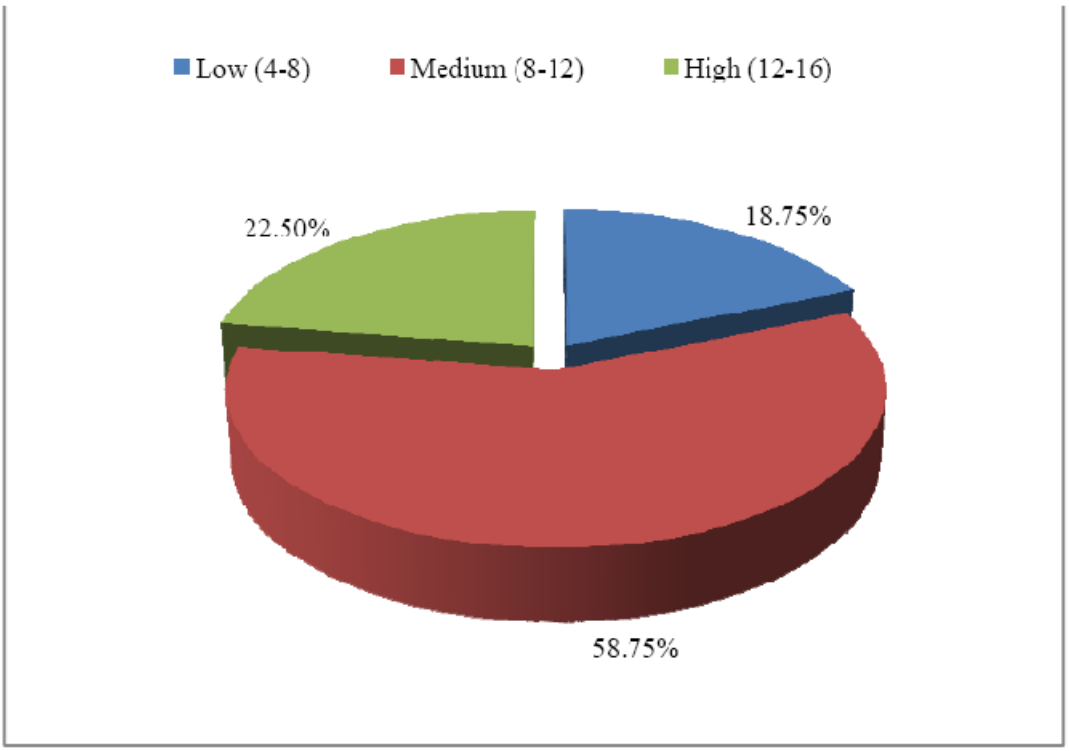

Fig. 9: Distribution of the respondents according to their economic motivation

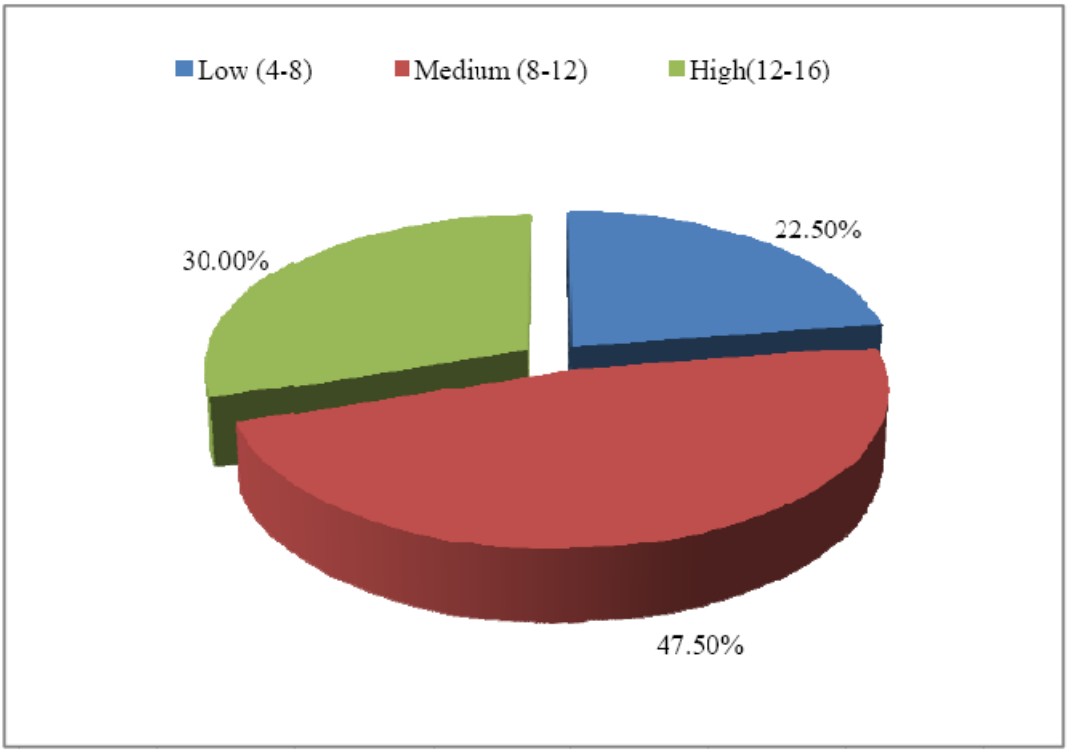

Fig. 10: Distribution of the respondents according to their risk bearing capacity

Table 4.4: Distribution of the respondents according to their Innovativeness

Innovativeness	Frequency (f)	Percentage (%)
Low (4-8)	15	18.75
Medium (8-12)	47	58.75
High (12-16)	18	22.50

4.1.11 Scientific Orientation

The response to this variable was studied on a three point continuum. Figures in Table 4.5 reveal that 43.75 percent had low scientific orientation followed by 40 percent of the respondents who had medium scientific orientation. Only 16.25 percent of the respondents had high scientific orientation. These findings are contrary to the findings of Kumar (2008).

Table 4.5: Distribution of the respondents according to their Scientific Orientation

Scientific orientation	Frequency (f)	Percentage (%)
Low (1-4)	35	43.75
Medium (4-7)	32	40.00
High (7-10)	13	16.25

4.1.12 Economic Motivation

Responses of the respondents recorded on a three point continuum have been presented in Table 4.6 The data reveal that 58.75 per cent had medium level of economic motivation. A little less than one-fourth of the respondents (22.50 per cent) had high economic motivation whereas 18.75 per cent of the respondents had low economic motivation.

Table 4.6: Distribution of the respondents according to their Economic Motivation

Economic motivation	Frequency (f)	Percentage (%)
Low (4-8)	15	18.75
Medium (8-12)	47	58.75
High (12-16)	18	22.50

4.1.13 Risk Bearing Capacity

Responses of the respondents were recorded on a three point continuum and have been given in Table 4.7. The data reveal that47.50 percent of the respondents had medium risk bearing capacity followed by 30 percent respondents who had high risk bearing capacity.

More than22 percent of the respondents had low risk bearing capacity. These findings are similar to those reported by Yasmin (2009).

Table 4.7: Distribution of the respondents according to their Risk bearing capacity

Risk bearing capacity	Frequency (f)	Percentage (%)
Low (4-8)	18	22.50
Medium (8-12)	38	47.50
High(12-16)	24	30

4.1.14 Area under selected crops

The information regarding area under selected crops i.e. Potato, Tomato and Chilli has been given in Table 4.8.

Table 4.8: Distribution of the respondents on the basis of area under selected crops

(n=80)

Crop	Area (Acres)	Frequency (f*)	Percentage(%)
Potato	5-12	23	35.38
	12-19	33	50.77
	19-26	9	13.85
Tomato	Below 1 acre	4	30.77
	1-2.5acre	7	53.85
	2.5-4	2	15.38
Chilli	Below 1 acre	7	36.84
	1-2	9	47.37
	2-4	3	15.79

* Multiple response

As far as potato growers are concerned about half of the respondents i.e. 50.77 per cent had grown potato on the area between 12-19 acres. About 35 percent of the respondents had grown potato on the area between 5-12 acres whereas 13.85per cent of the respondents had grown potato on area between 19-26 acres.

A little more than half of the tomato growers (53.85 per cent) had grown tomato on the area between one to two and a half acres of land. About 31per cent of the vegetable growers had grown tomato on less than one acre of land. Only 15.38 per cent of the vegetable growers had grown tomato on area between 2.5-4 acres.

As far as chilli growers are concerned, 47.37 per cent of the respondents had grown chilli on area of 1-2 acres whereas 36.84per cent of the respondents had grown chilli on area less than 1 acre. Only 15.79 per cent of the respondents had grown chilli on area between 2-4 acres.

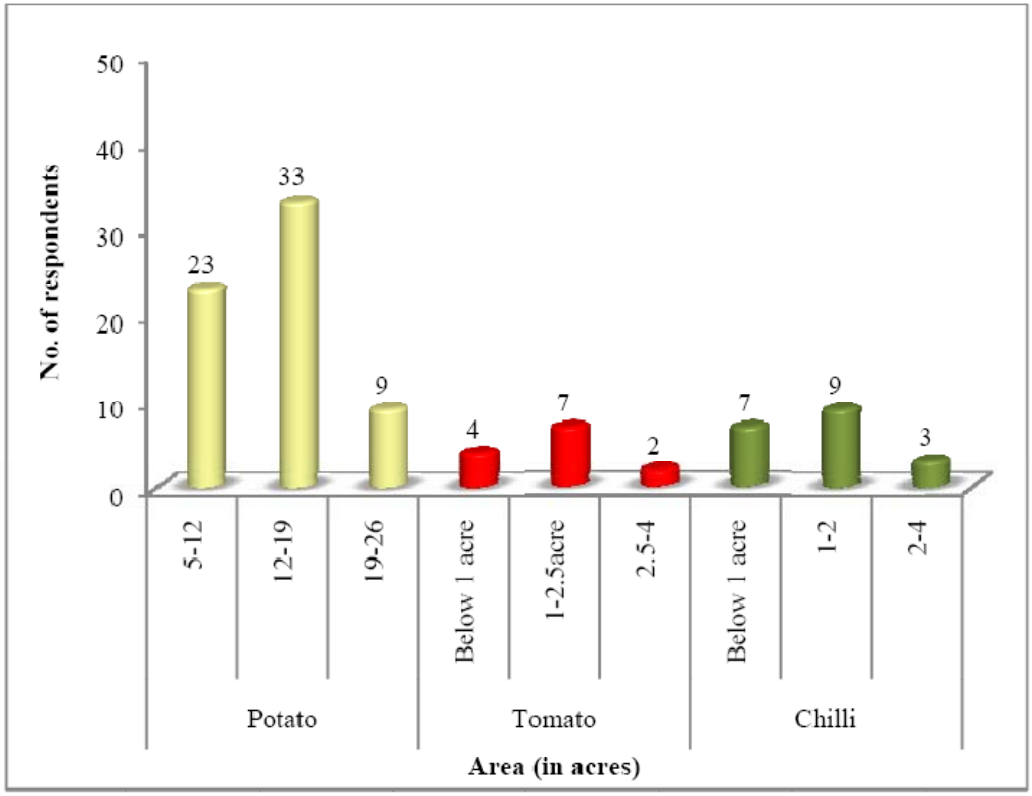

Fig. 11: Distribution of the respondents on the basis of area under selected crops

4.4.15 Other crops grown

The data regarding to crops grown other than selected crops have been presented in Table 4.9.

Table 4.9: Distribution of the respondents according to other crops grown by them apart from selected crops

(n=80)

Other crops grown	Frequency *	Percentage
Moong	33	41.25
Mentha	26	32.50
Paddy	70	87.50
Maize(fodder)	30	37.50
Wheat	80	100
Garlic /Onion	10	12.50
Cauliflower	18	22.50
Cucurbits	9	11.25

* Multiple response

All the respondents were growing wheat on their farms along with the selected crops. About 87per cent of the vegetable growers grew paddy on their farms. About 41.25 per cent of the respondents cultivated moong (sathi) on their farms followed by 37.5 per cent of the respondents that cultivated Maize (fodder) on their farms. About 32.5 per cent of the respondents had grown mentha on their farms along with selected crops whereas about 22.5 per cent of the vegetable growers cultivated Cauliflower on their farms along with selected crops. Only 12.50 per cent and 11.25 per cent of respondents cultivated onion/garlic and cucurbits on their farms respectively.

Table 4.10: Distribution of area under selected crops by the respondents

Crop	Total Area(Acres)	Percent area
Potato	793	62.13
Tomato	22	1.72
Chilli	29	2.27
		Total sampled area=1276.25 (acres)

The data given in Table 4.10 clearly indicates that potato was cultivated on a little less than two-third i.e. 62.13 per cent of the total sampled area whereas chilli was cultivated on 2.27 per cent of the total sampled area. Less than two per cent of the total sampled area

was under tomato cultivation. It can be concluded that maximum proportion of the total sampled area was under the cultivation of potato.

4.2 Opinion of the respondents towards vegetable processing

The opinion of the respondents about processing of vegetables have been given in Table 4.11.

Table 4.11: Distribution of the respondents according to their opinion regarding vegetable processing

S. No.	Opinion	Agree		Disagree	
		Frequency	Percentage	Frequency	Percentage
1.	It is profitable process	80	100	--	--
2.	It is a complex process	80	100	--	--
3.	It increases the market value of vegetable product	80	100	--	--
4.	It requires technical knowledge	80	100	--	--
5.	Higher cost of construction of processing unit	80	100	--	--
6.	It enhances the shelf life of product	80	100	--	--
7.	Higher charge of storage	30	37.50	50	62.50
8.	Processed foods are easy to transport	80	100	--	--
9	There is scarcity of equipments required for processing	23	28.75	57	71.25
10	It requires huge initial investment	80	100	--	--
11	Scarcity of storage Infrastructure for processed vegetables at farm level.	14	17.50	66	82.50
12	Technical skills are required for operating equipments and machines.	80	100	--	--
13	Processed foods catches more attraction of the consumers as it adds flavor to the product	80	100	--	--

All the respondents were of the opinion that processing of vegetables is a profitable but a complex process which requires comprehensive technical knowledge and huge initial investment for setting up of a processing unit. All the respondents had opinion that vegetable processing increases the market value of the product, it enhances the shelf-life of the product, processed foods are easy to transport and they catch attraction of the consumer as it adds flavor to the product.

A little more than one-fourth (28.75per cent) of the vegetable growers had the opinion that there is lack of equipment required for setting up a processing unit. Majority of the respondents (71.25 per cent) opined that one might be unaware of these machines but there is no scarcity of these machines and equipments. Only 17.50 per cent of the vegetable growers were of the opinion that there is lack of storage infrastructure for storage of processed vegetables whereas majority of the respondents (82.50 per cent) had the opinion that there is no lack of storage infrastructure for processed vegetables at farm level.

It can be concluded that majority of the respondents had favorable opinion towards vegetable processing but the constraints perceived by them were proving to be hindrance in the path of adoption of vegetable processing as an occupation.

4.3 Association of socio-personal characteristics with willingness for processing of vegetables

In order to determine the relationship among the independent variables and the dependent variables, chi-squares test was applied to the data.

4.3.1 Education and Willingness

A critical look at the figures presented in Table 4.12 indicate that there was significant association between the education level of the respondents and willingness for processing of vegetables reflecting that respondents with higher educational level were willing to go for vegetable processing than those with lower educational level. A perusal of the data reveal that a little less than one-third of the matriculates (34.28 %) were willing to go for processing of vegetables. Further the data reveal that three-fourth (75 per cent) of the graduates and two-third of the post graduates (66.67) were willing to go for processing of vegetables. It is obvious that a well-educated person is more aware and always seeking for better future. They always want to apply the available knowledge to change their present situation. These findings are in agreement with the results of Renuka (1982), Singh and Kunzroo (1985), Kaur and Singh (1992).

Table 4.12: Association of Education with willingness to go for vegetable processing

Educational level	Willingness	
	Yes	No
Primary	0(0)	8(100)
Middle	1(10.00)	9(90.00)
Matric	12(34.28)	23(65.72)
Senior Secondary	6(37.50)	10(62.50)
Graduate	6(75.00)	2(25.00)
Post Graduate	2(66.67)	1(33.33)

Calculated χ^2= 9.799** d.f.= 2

** Significant at 1 per cent level

4.3.2 Family type and Willingness

It can be seen from the data given in Table 4.13 that there was non-significant relationship between family type and willingness to go for processing of vegetables. Nearly three-fourth of the respondents (71.43 %) from nuclear families and more than half of the respondents(58.06 %) from joint families were unwilling to go for processing of vegetables. There seems to be no effect of family type on willingness to go for processing of vegetables.

Table 4.13: Association of family type with willingness to go for vegetable processing

Family type	Willingness	
	Yes	No
Nuclear families	14(28.57)	35(71.43)
Joint families	13(41.94)	18(58.06)

Calculated χ^2 = 1.517 ^{NS} d.f.= 1

NS= Non-significant

4.3.3 Family size and Willingness

A close look at the data in Table 4.14 brings out the fact that there was non-significant association between family size and willingness to go for processing of vegetables. Nearly three-fourth of the respondents (73.17 %) having family members upto five and more than half of the respondents from families having more than five members were unwilling to go for processing of vegetables. It is obvious that in a processing unit the most of work is done by labour. There seems to be no effect of family size on willingness to go for processing of vegetables.

Table 4.14: Association of family size with willingness to go for vegetable processing

Family size	Willingness	
	Yes	No
Upto 5	11(26.83)	30(73.17)
5 and above	16(41.02)	23(58.98)

Calculated χ^2 = 1.802 ^{NS} d.f.= 2

NS= Non-significant

4.3.4 Operational land holding and Willingness

It is clear from the data in Table 4.15 that there is significant association between operational land holding and willingness to go for processing of vegetables. More than three-fourth of the respondents having operational land holding more than 25 acres were willing to go for processing of vegetables. It is obvious that the farmer will only go for processing if he has enough production of raw material to process. It is obvious that more the area under the crop more will be the production that will act as raw material for processing. In case if a farmer with less operational land holding wishes to go for processing of vegetables he must ensure raw material from fellow farmers and nearby areas to start with.

Table 4.15: Association of Operational Land Holding with willingness to go for vegetable processing

Operational land holding (acres)	Willingness	
	Yes	No
2.5-5	1(14.28)	6(85.72)
5-10	7(24.14)	22(75.86)
10-25	9(29.03)	22(70.97)
>25	10(76.92)	3(23.08)

Calculated χ^2 = 3.890 * d.f.= 1

* Significant at 5 per cent level

4.3.5 Experience in Vegetable cultivation and Willingness

A critical look at the Table 4.16 indicates that there is non-significant association between experience in vegetable cultivation and willingness for vegetable processing. When experience is more a farmer tends to concentrate on his work rather than trying something new when he knows the previous one is giving him benefit.

Table 4.16: Association of experience with willingness to go for vegetable processing

Experience in vegetable cultivation (years)	Willingness	
	Yes	No
2-9	7(36.84)	12(63.16)
9-16	9(23.68)	29(76.32)
16-23	11(47.83)	12(52.17)

Calculated χ^2 =3.841^{NS} d.f.= 2

NS= Non-significant

4.3.6 Income and Willingness

A close examination of Table 4.17 reflects that there was significant association between income and willingness to go for processing of vegetables. Nearly two-third of the respondents having income above 9.5 lacs/annum were willing to go for processing of vegetables. As the income of farmer increases he tends to extend his scale of work to another level to maximize his profit

Table 4.17: Association of Income with willingness to go for vegetable processing

Income (lacs/annum)	Willingness	
	Yes	No
2-4.5	1(10.00)	9(90.00)
4.5-7	7(20.00)	28(80.00)
7-9.5	8(44.44)	10(55.56)
Above 9.5	11(64.70)	6(35.30)

Calculated χ^2 = 13.689 ** d.f.= 3

** Significant at 1 per cent level

4.3.7 Extension Contacts and Willingness

A perusal of the data given in Table 4.18 indicates that there is non-significant association between extension contacts and willingness to go for processing of vegetables. More than three-fourth (80.56 %) of the respondents having medium extension contacts and a little less than half(45.46%) having high extension contacts were not interested in processing of vegetables. The response was such because the respondents said that the extension agencies themselves don't have much to tell about the processing of vegetables. The results of the study are in agreement with the findings of Choukidar and George (1972), Pathak (1981), Cheema (1982) and Singh (1997).

Table 4.18: Association of Extension Contacts with willingness to go for vegetable processing

Extension contacts	Willingness	
	Yes	No
Low (0-3)	14(42.42)	19(57.58)
Medium (3-6)	7(19.44)	29(80.56)
High (6-9)	6(54.54)	5(45.46)

Calculated χ^2 =1.890 ^{NS} d.f.= 2

NS= Non-significant

4.3.8 Mass media exposure and Willingness

As evident from the Table 4.19 that there was non-significant association between mass media exposure and willingness to go for processing of vegetables. More than three-fourth of the respondents having medium extension contacts and more than half of the respondents having high extension contacts were unwilling to go for processing of vegetables. The findings are in agreement with the findings of Cheema (1982), Pathak (1981) and Singh (1997).

Table 4.19: Association of Mass Media Exposure with willingness to go for vegetable processing

Mass Media Exposure	Willingness	
	Yes	No
Low (0-4)	7(50.00)	7(50.00)
Medium (4-8)	12(24.49)	37(75.91)
High (8-12)	8(47.06)	9(52.94)

Calculatedχ^2 = 4.879 ^{NS}

NS= Non-significant

4.3.9 Innovativeness and Willingness

The association between Innovativeness and Willingness to go for processing of vegetables was found to be significant as clear from Table 4.20. More than 80 per cent of the respondents having high Innovativeness were willing to go for processing of vegetables. An innovative person is always keen to try new ventures on his farm to increase his income. The results are in line with the findings of Singh (1997).

Table 4.20: Association of Innovativeness with willingness to go for vegetable processing

Innovativeness	Willingness	
	Yes	No
Low (4-8)	6(40.00)	9 (60.00)
Medium (8-12)	9(19.56)	12(63.16)
High (12-16)	37(80.44)	7(36.84)

Calculatedχ^2 = 11.750** d.f.= 2

** Significant at 1 per cent level

4.3.10 Scientific Orientation and Willingness

A close look at Table 4.21 indicates that there is significant association between scientific orientation and willingness to go for processing of vegetables

Table 4.21: Association of scientific orientation with willingness to go for vegetable processing

Scientific orientation	Willingness	
	Yes	No
Low (1-4)	6(17.14)	29(82.86)
Medium (4-7)	12(37.5)	20(62.5)
High (7-10)	9(69.23)	4(30.77)

Calculatedχ^2 = 11.838** d.f.= 2

* Significant at 1 per cent level

4.3.11 Risk Bearing Capacity and Willingness

A critical analysis of Table 4.22 indicates that there is significant association between risk bearing capacity and willingness to go for processing of vegetables**.** More than 62.5 per cent of the respondents having high risk bearing capacity were willing to go for processing of vegetables.

Table 4.22: Association of risk bearing capacity with willingness to go for vegetable processing

Risk bearing capacity	Willingness	
	Yes	No
Low (4-8)	3(16.67)	15(83.33)
Medium (8-12)	9(23.68)	29(76.32)
High (12-16)	15(62.5)	9(37.5)

Calculated χ^2 = 12.943** d.f.= 2

* Significant at 1 per cent level

It is true that when a person moves from realm of known to unknown he always has some fear and feels hesitant to take risk. So vegetable growers having high risk bearing capacity can go for processing of vegetables as it requires huge initial investment. The results of the study are in line with the findings of Singh(1997).

4.3.12 Economic Motivation and Willingness

A perusal of data in Table 4.23 indicates that there is significant association between Economic Motivation and Willingness to go for processing of vegetables. A person who wants to increase his income definitely tries something new. This is why there is significant association between economic motivation and willingness to for processing of vegetables. The results are in agreement with the findings of Krishnaraj and Dubey (1991) and Kaur and Singh(1992).

Table 4.23: Association of Economic motivation with willingness to go for vegetable processing

Economic motivation	Willingness	
	Yes	No
Low (4-8)	7(46.67)	8(53.33)
Medium (8-12)	9(19.56)	37(80.44)
High (12-16)	11(57.89)	8(42.11)

Calculated $\chi^2 = 11.627$ ** d.f.= 2

** Significance at 1 per cent level

4.4 Problems perceived by the vegetable growers in processing of vegetables

Farmers perceive constraints to start any new venture. The information so collected has been placed in the Table 4.24. There are different types of problems foreseen by the respondents. Amongst the technical problems, inadequate knowledge about processing of vegetables was perceived as a serious problem by 47.50 per cent of the respondents whereas 28.75 per cent regarded it as a very serious problem. About 24 per cent felt it as a problem but not as a serious problem.

About 46.25 per cent of the respondents perceived lack of knowledge about machines and equipments needed for processing of vegetables as a serious problem. Lack of knowledge and skill in handling of machines was perceived as a serious problem by 43.75 per cent of the respondents. However a little more than one-fourth (27.50%) of the respondents did not perceive it as a serious problem. As far as storage problems are concerned, 17.5 per cent of the respondents felt non-availability of storage infrastructure as a serious problem whereas non-availability of storage infrastructure for storage of processed as

well as raw vegetables was not perceived as a serious problem by 82.50 per cent of the respondents.

Table 4.24: Distribution of the respondents according to problems perceived by them in vegetable processing

(n=80)

S.No.	Problems	Very Serious		Serious		Not Serious	
1.	**Technical Problems**	F	%	f	%	f	%
	a. Inadequate knowledge about Processing	23	28.75	38	47.50	19	23.75
	b. Lack of knowledge about machines and Equipments needed	25	31.25	37	46.25	18	22.50
	c. Lack of knowledge and skill in handling of Machines	23	28.75	35	43.75	22	27.50
2.	**Storage Problems**						
	a. Non-availability of storage Infrastructure	--	--	14	17.50	66	82.50
	b. High storage charges	12	15	52	65	16	20
	c. Unsatisfactory conditions of cold storage	42	52.50	23	28.75	15	18.75
3.	**Financial Problems**						
	a. Lack of finance	60	75	20	25	--	--
	b. Difficulty in getting loan	30	37.50	50	62.50	--	--
	c. High cost of equipments involved	55	68.75	25	31.25	--	--
4.	**Marketing Problems**						
	a. Non remunerative price	18	22.50	23	28.75	39	48.75
	b. In adequate transport facilities	6	7.50	9	11.25	65	81.25
5.	**Other Problems**						
	a. Non availability of skilled labor	41	51.25	24	30	9	11.25
	b. Lack of time for processing of vegetable	60	75	15	18.75	5	6.25

The study further reveal that financial problems were perceived by almost all the vegetable growers. Majority of the respondents i.e. 75 per cent considered lack of finance as very serious problem and about two-third i.e. 68.75 per cent of the respondents considered high cost of equipments involved in processing of vegetables as a very serious problem.

Among the marketing problems 28.75 per cent of the respondents perceived non remunerative price as a serious problem whereas 22.5 per cent of the respondents perceived it as a very serious problem. Only 11.25 per cent of the respondents reported inadequate

transport facilities as a serious problem. Majority of the respondents i.e. 81.25 per cent perceived it as a problem but not a serious problem.

Non-availability of skilled labour was considered as a very serious problem by 51.25 per cent of the respondents whereas 30 per cent regarded it as a serious problem. About 75 per cent of the respondents regarded lack of time for processing of vegetables as a very serious constraint.

The problems perceived by the respondents were also ranked on the basis of mean scores. The data have been presented in Table 4.25.

Table 4.25: Ranking of problems perceived by the respondents

S.No.	Problems	Mean score	Rank
1.	**Technical Problems**		
	a. Inadequate knowledge about Processing	1.05	8th
	b. Lack of knowledge about machines and Equipments needed	1.09	7th
	c. Lack of knowledge and skill in handling of Machines	1.01	9th
2.	**Storage Problem**		
	a. Non-availability of storage Infrastructure	0.17	13th
	b. High storage charges	0.52	11th
	c. Unsatisfactory conditions of cold storage	1.34	5th
3.	**Financial Problems**		
	a. Lack of finance	1.75	1st
	b. Difficulty in getting loan	1.39	4th
	c. High cost of equipments involved	1.66	3rd
4.	**Marketing Problems**		
	a. Non remunerative price	0.74	10th
	b. In adequate transport facilities	0.26	12th
5.	**Other Problems**		
	a. Non availability of skilled labor	1.32	6th
	b. Lack of time for processing of vegetable	1.69	2nd

It is clear from the Table 4.25that lack of finance was considered as the most serious problem with the mean score of 1.75. This is due to the fact that processing of vegetables needs a huge initial investment. Not all the individuals can start processing of vegetables which limits the processing of vegetables in the hands of big companies. Lack of time for processing of vegetables was considered as the second serious problem by the respondents with the mean score of 1.69. The respondents perceived that going for processing of vegetables is not an easy task as there is lack of time for it. This was because the respondents responded that there are other aspects like marketing of processed foods that needed to be taken care of. It's not just the processing of vegetables but also its supply and demand that needs to be taken care of along with its production. The third rank was obtained by the problem of high cost of equipments involved in vegetable processing with mean score of 1.66. Vegetable growers responded that high costs of equipments are involved to start processing which consist of automatic washers, graders, driers etc. These machines are costly and are not within the reach of every individual. Difficulty in getting loan obtained rank 4th with the mean score of 1.39. To start new venture like processing of vegetables which involves huge investment, an individual may require some sort of loan or subsidy to start with. But to avail such loan there are more formalities that an individual has to fulfill to get loan from any bank or any other institution. These formalities prove to be quiet time consuming and also an individual may feel little bit unsecure as there is always a risk in starting a new venture that it may or may not succeed. An unsatisfactory condition of storage obtained 5th rank with the mean score of 1.34. This may be due to improper conditions of the cold storage that impair the quality of vegetables which directly affects the quality of processed food to be made. In case of potato, if the raw potatoes are not stored at proper temperature it will lead to sprouting of the potatoes which badly affect the quality of fries or chips made from them. Lack of knowledge about machines and equipments needed, inadequate knowledge about processing and lack of knowledge and skill in handling the machines obtained rank 7th, 8th and 9th with the mean scores of 1.09, 1.05 and 1.01 respectively.

4.5 Suggestions of the respondents to overcome Constraints perceived in Processing of Vegetables

Different suggestions were given by the respondents to overcome the problems perceived in processing of vegetables and have been given in Table 4.26. Majority of the respondents i.e. 75 per cent suggested that the procedure for taking loan from various institutions or banks should be made easy and simple. More than two-third (68.75per cent) of the respondents suggested that the rate of interest should be low for the farmers who want to adopt processing of vegetables as their occupation

Table4.26: Distribution of the respondents according to their suggestions to overcome problems perceived in vegetable processing

(n=80)

S.No.	Suggestions	Frequency*	Percentage
1.	Subsidies should be provided for setting up processing unit	50	62.50
2.	Loan procedures should be made simple	60	75
3.	Marketing infrastructure should be strengthened	45	56.25
4.	Technical training facilities should be provided for those who are interested	35	43.75
5.	The rate of interest on loan should be low for vegetable growers who want to adopt processing as an occupation	55	68.75
6.	Contracting companies should be there to purchase the processed food from the vegetable growers.	53	66.25

*Multiple response

Almost two-third of the respondents (66.25%) suggested that there should be some agencies to purchase the processed products from the vegetable growers to ensure marketing security for the processors and even for the farmers who may want to adopt this as an occupation in future. A little less than two-third of the respondents (62.50%) suggested that government should provide subsidies to the farmers for setting up processing unit as it involves huge initial investment and it is not possible for the individuals to set up the processing units alone without any subsidy. This is one of the reasons that the processing of vegetables is limited to companies like Frito lays, ITC (Indian Tobacco Company) etc. A little more than half of the respondents (56.25%) suggested that marketing infrastructure should be strengthened so that the processors may be able to sell their produce quickly and at reasonable rates. A little more than 40 per cent of the respondents suggested that technical facilities should be provided to those who want to set up their processing units.

Chapter-V

SUMMARY

In this chapter a brief summary and conclusions of the study have been presented, so as to understand the implications of the findings.

Majority of Indian population is living in rural areas. Therefore, for overall development of the country, there is need to develop rural society. The economy of rural society is based on agriculture and allied sectors. In ancient times, plenty of food was available from natural resources and also due to hunting and wandering habits of man, no major problems were faced by mankind in terms of food security. Today population explosion has caused a great imbalance between the availability of food and its demand. Hunger and malnutrition are the most threatening problems in the developing countries. Cereal based diet is the main feature of the Indian food habit.

With the invention of high yielding varieties of rice and wheat, national food scenario has changed completely from the food shortage of mid-1960 to the surplus of the late 1990, and early years of 21stcentury.States like Punjab and Haryana played a leading role in the green revolution and made the country self-sufficient in the food production. Rice and Wheat cultivation has emerged as a monoculture that resulted in two types of problems i.e. economic and ecological. Extensive coverage under this system disturbed ecosystem of Punjab state particularly water balance and soil health and secondly we have already achieved about 75 per cent of the potential so far as wheat and paddy is concerned and there is hardly any scope left for increasing the productivity of these crops, unless there is another technological breakthrough in development of new high yielding varieties of these crops.

India holds a vast potential for growing a large variety of fruits and vegetables. Vegetable farming refers to growing of vegetable crops for domestic and commercial purposes. India has divergent climatic conditions and hence a large number of vegetable crops and their varieties are in easy reach of farmers to grow them according to their suitability and socio- economic conditions. At this point of time one of the possible ideas which one think of is going for value addition of horticultural crops which increases the shelf life of the horticultural produce and also ensures its availability throughout the year to prevent glut in season and scarcity during off season. Vegetables are the integral part of our daily diet in all walks of society. They act as protective foods. Their use in daily diet demands a huge production in the country like India where population explosion out space all production resources. With the passage of time agriculture has been transformed from subsistence level to commercial level. With the new economic policy emphasizing on liberalization the production strategies will become more export oriented. India has

comparative more advantage in horticulture, vegetables and floriculture. This advantage can be maximized and sustained if these products are exported in processed forms but the advantage is minimal in exporting these in raw form. So major emphasis of new policy is on increasing the productivity, quality standard, packaging and other related things which will improve the quality of the product. Rather than placing raw produce directly in market, value added products should be placed in market so that benefits of the farmers can be maximized.

Benefits of food processing include toxin removal, preservation, easy marketing and increasing food consistency. In addition, it increases seasonal availability of many foods, enables transportation of delicate perishable foods across long distances and makes many kinds of foods safe to eat by de-activating spoilage and pathogenic micro-organisms. Processed foods are usually less susceptible to early spoilage than fresh foods and are better suited for long distance transportation from the source to the consumer. When they were first introduced, some processed foods helped to alleviate food shortages and improved the overall nutrition of populations as it made many new foods available to the masses. The act of processing can often improve the taste of food significantly.

Due to increasing standards of living in the cities and the rapid urbanization taking place in the rural areas, consumption of processed products is expected to go up steadily. At present only two per cent of the horticultural produce is being processed into value added products. There may be some problems perceived by the vegetable growers in processing of vegetables. Very few studies have been conducted in this area. Keeping the above facts in view, the present study entitled "Opinion of the vegetable growers regarding vegetable processing in Ludhiana district of Punjab" was undertaken under following objectives:

5.1 Objectives

5.1.1 To study the socio-personal characteristics of the vegetable growers.

5.1.2 To study the opinion of vegetable growers about processing of vegetables.

5.1.3 To study the problems perceived by the vegetable growers in processing of vegetables.

5.1.4 To seek suggestions from the vegetable growers to overcome problems perceived by them in processing of vegetables

5.2 Research Methodology

The study was conducted in Ludhiana district of Punjab. A list of vegetable growers who were cultivating Potato, Chilli and Tomato on their farms was collected from the office

of State Department of Horticulture, Ludhiana. From that list, a sample of 80 farmers was taken by using Probability Proportionate to number of farmers growing selected crops i.e. potato, chilli and tomato. The research instrument constructed for the present study consisted of four parts: The first part dealt with socio-personal characteristics of the vegetable growers like age, family type, education, family size, operational land holding, area under vegetable cultivation, experience in vegetable cultivation, mass media exposure, risk bearing capacity, innovativeness, scientific orientation, economic motivation and extension contacts. The second part included statements/items to know the opinion of the vegetable growers about vegetable processing which was studied on a two point continuum viz Agree and Disagree. The third part dealt with problems/constraints perceived by the vegetable growers in processing of vegetables. It was studied on a three point continuum viz Very Serious, Serious and Not Serious. The fourth part dealt with the suggestions of the respondents to overcome the problems perceived in processing of vegetables.

The research instrument was pre-tested on 15 non-sampled respondents. Pre-testing was done with the objective to remove any ambiguities and to overcome the difficulties perceived in respect of clarity and understanding of the questions asked in the Interview Schedule. The data were collected from the respondents with the help of personal interview method. The data were analysed with the help of appropriate statistical tools such as frequency, percentage, mean score, cumulative frequency cube root method and Chi-square test.

5.3 Salient Research Findings

The salient research findings of the study have been given under the following headings:

5.3.1 Socio-personal characteristics of the respondents

It was found that the age of the respondents varied from 25-64 years. A little more than half of the respondents (52.5 %) belonged to the age group of 38-50 years. The maximum number of respondents (43.75%) were having matriculate level of education. Most of the respondents (61.25%) had nuclear families as compared to 38.75 per cent of respondents that had joint families. About 51per cent of the respondents were having upto five members in the family. About 39 per cent of the respondents were medium farmers having operational land holdings between 10-25 acres and almost similar percentage of respondents i.e. 36.25 per cent were semi-medium farmers having operational land holdings between 5-10 acres. A little less than half of the respondents (47.50 per cent) had experience

between 9-16 years. About 44per cent of the respondents had annual income between 4.5-7 lacs.

About 45 per cent of the respondents had medium extension contacts. Majority (61.25 per cent) of the respondents had medium mass media exposure. A little more than half of the respondents (57.5 per cent) had high degree of innovativeness and 43.75 per cent and 40 per cent of the respondents had low and medium degree of scientific orientation respectively. A little less than half (47.5 per cent) of the respondents had medium risk bearing capacity and 58.75 per cent of the respondents had medium level of economic motivation.

Almost half of the potato growers (50.77per cent) cultivated potato on an area between 12-19 acres .Only 13.85per cent of the respondents grew potato on area between 19-26 acres. As far as the chilli growers are concerned 47.37 per cent of the chilli growers had grown chilli on area between 1-2 acres. Majority of the tomato growers i.e. 53.85 per cent had grown tomato on area between 1-2.5 acres. All the respondents cultivating selected crops were also cultivating wheat and 87.50 per cent of the respondents cultivated rice along with these selected crops.

5.3.2 Opinion of the respondents regarding vegetable processing

All the respondents were of the opinion that processing of vegetables is a profitable but a complex process which requires comprehensive technical knowledge and huge initial investment for setting up of a processing unit. All the respondents had opinion that vegetable processing increases the market value of the product, it enhances the shelf-life of the product, processed foods are easy to transport and they catch attraction of the consumer as it adds flavor to the product.

A little more than one-fourth (28.75per cent) of the vegetable growers had the opinion that there is lack of equipment required for setting up a processing unit. Majority of the respondents (71.25 per cent) opined that one might be unaware of these machines but there is no scarcity of these machines and equipments. About 17.50per cent of the vegetable growers were of opinion that there is lack of storage infrastructure for storage of processed vegetables whereas majority of the respondents (82.50 per cent) had opinion that there is no scarcity of storage infrastructure for processed vegetables at farm level.

It can be concluded that majority of the respondents had favorable opinion towards vegetable processing but the constraints perceived by them were proving to be hindrance in the path of adoption of vegetable processing as an occupation.

5.3.3 Problems perceived by respondents regarding vegetable processing

About 46per cent of the respondents perceived lack of knowledge about machines and equipments needed for processing of vegetables as a serious problem. Lack of knowledge and skill in handling of machines was perceived as a serious problem by 43.75 per cent of the respondents. As far as storage problems non-availability of storage infrastructure for storage of processed as well as raw vegetables was perceived as a problem but not as a serious by 82.50 per cent of the respondents.

The study further revealed that financial problems were perceived by almost all the vegetable growers. Majority of the respondents i.e. 75 per cent considered lack of finance as very serious problem and about two-third i.e. 68.75 per cent of the respondents considered high cost of equipments involved in processing of vegetables as a very serious problem.

Among the marketing problems 28.75 per cent of the respondents perceived non remunerative price as a serious problem whereas 22.5 per cent of the respondents perceived it as a very serious problem. Only 11.25 per cent of the respondents reported that inadequate transport facilities as a serious problem. Majority of the respondents i.e. 81.25 per cent perceived it as a problem but not a serious problem.

Non-availability of skilled labour was considered as a very serious problem by 51.25 per cent of the respondents. About 75 per cent of the respondents regarded lack of time for processing of vegetables as a very serious constraint.

Lack of finance was considered as the most serious problem as it obtained 1st rank with the mean score of 1.75. This is due to the fact that processing of vegetables needs a huge initial investment. Lack of time for processing of vegetables was considered as the second serious problem by the respondents with the mean score of 1.69. The third rank was obtained by the problem of high cost of equipments involved in vegetable processing with mean score of 1.66. Difficulty in getting loan obtained 4thrankwith the mean score of 1.39.

5.3.4 Suggestions of the respondents to overcome Problems perceived by them regarding vegetable processing

About 75 per cent of the farmers suggested that the procedure for taking loan from various institutions or banks should be made easy. Also 68.75 per cent of the farmers suggested that the rate of interest should be low for the farmers who want to adopt processing of vegetables as their occupation. About two-third (66.25 per cent)of the respondents suggested that there should be some agencies to purchase the processed products from the farmers. A little less than two-third i.e. 62.5 per cent of the farmers suggested that government should provide subsidies to the farmers for setting up processing unit as it involves huge initial investment. A little more than half of the respondents (56.25 per cent)

said that marketing infrastructure should be strengthened so that the processors may be able to sell their produce quickly and at reasonable rates.

5.3.5 Association of socio-personal characteristics with willingness for processing of vegetables

It was found that education, size of operational land holding, income, innovativeness, economic motivation and risk bearing capacity had significant association with willingness to go for processing of vegetables. Other socio-personal characteristics like family type, family size, extension contacts, mass media exposure, and experience in vegetable cultivation had non- significant association with willingness to go for processing of vegetables.

5.4 Conclusions

It can be concluded from the findings of the study that most of the vegetable growers had favourable opinion towards processing of vegetables. There were different problems perceived by the respondents which may be the main reasons for non-adoption of vegetable processing as an occupation. Until and unless the vegetable growers are not motivated by different extension agencies there is very little scope of adopting vegetable processing as an occupation by the vegetable growers.

The suggestions to promote vegetable processing have been given below:

1. There should be provision of loans at low rate of interest for the vegetable growers who are willing to go for processing of vegetables.
2. Incentives in the form of subsidies should be provided by the government to the vegetable growers those who are interested in adopting vegetable processing as an occupation.
3. There should be some contracting agencies to purchase processed products from the vegetable growers in order to ensure marketing security for the vegetable growers.
4. Marketing infrastructure should be strengthened. Farmer's groups / organizations should be strengthened for marketing of their processed products collectively. Efforts should be made by the government to regulate the markets for processed products
5. Technical facilities should be provided by State Departments of Horticulture to promote processing of vegetables.

6. Farmers should be motivated to go for processing of vegetables by the officials of State Department of Horticulture by organizing institutional and non-institutional training programmes.
7. Awareness about the benefits of processing of vegetables should be created amongst the farming community with the use of mass media.

Suggestions for future research

1. The study can be stretched to other districts of Punjab.
2. The study can be stretched to processing of other food items may be fruits and cereals.
3. Export potential of processed food can be studied.
4. Awareness of the farmers regarding processing of agricultural and horticultural produce can be studied.

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INTERVIEW SCHEDULE

Part 1

Socio-personal characteristics of vegetable growers

1. Name:
2. Father's name:
3. Age (Yrs):
4. Family type: Joint family ☐ Nuclear family ☐

5. Number of family members:
6. Income:

7. Education:

8. Operational land holding (acres):
   a) land owned: _____ acres
   b) land leased in: _____ acres
   c) land leased out: _____ acres

   (operational land holding = land owned + land leased in - land leased out)

9. Area under vegetable crops

Crop		No. of acres
i)	Potato	……..
ii)	Chilli	……..
iii)	Tomato	……..

   Other crops grown: …….

10. Mass media exposure:
    How often do you read, listen and view the following sources for getting information about vegetable processing:

Source		Always	Some time	Never
i)	Farm broadcasts			
	a) Kheti Bari	_____	_____	_____
	b) UnnatKheti	_____	_____	_____
	c) Dehati Programme	_____	_____	_____
	d) Any other (Please specify)	_____	_____	_____

ii) Farm telecast

a) MeraPind Mere Khet _____ _____ _____

b) SawiDharti _____ _____ _____

iii) Farm literature

a) ChangiKheti _____ _____ _____

b) KhetiDuniya _____ _____ _____

c) Progressive Farming _____ _____ _____

d) Newspapers _____ _____ _____

e) Any other

{Please specify) _____ _____ _____

11. Extension contacts:

Please specify how many times you have met the following sources for getting the latest information regarding vegetable processing:

Source		Always	Some time	Never
i)	H.D.O	_____	_____	_____
ii)	KVK	_____	_____	_____
iii)	Scientists of PAU	_____	_____	_____
iv)	Progressive Farmers	_____	_____	_____
v)	Relatives / Fellow farmers	_____	_____	_____

_____

12. How long you have been cultivating vegetable crops (Yrs)

13. Risk bearing capacity (scale developed by Supe and Singh, 1976):

Please give your response to each of the following statements in terms of Agree (A), Undecided (UD) or Disagree (DA).

S.No.	Statements	Agree	Undecided	Disagree
1.	Knowing the chances of success are high, one should take risk.			
2.	I will continue vegetable processing, even if it is risky.			
3.	One should take decision of starting new venture by keeping in view the past experience.			
4.	In order to excel, it is necessary to take risk.			
5.	A farmer who is willing to take greater risk than the average usually does better financially.			

6.	When it comes to chance, I would go safe than feel sorry.			
7.	In risky situation, one learns a great about the new practice.			
8.	Financially sound farmers can go for vegetable processing.			

14. Innovativeness:

Please indicate your response to the following statements in terms of Agree (A), Undecided (UD) or Disagree (DA).

S.No.	**Statements**	**Agree**	**Undecided**	**Disagree**
1.	I am among the first in my circle of friends to think about starting processing of vegetables			
2.	I take advantage of the first available opportunity to find out the new and different results.			
3.	Prior to adopting new idea like processing of vegetables, I prefer to consult relative/friend who has experience in it.			
4.	I would like a job that does require me to keep learning new tasks in processing of vegetables			
5.	I am the kind of the person who always looks for an exciting, stimulating and active life.			
6.	I decide to try something new without relying on the opinion of the friends who have already tried it.			
7.	Whenever any new things like processing of vegetables come, I try it on the farm.			
8.	The innovative people are those who start new venture after seeing its benefits.			
9.	I try new venture without consulting the sources that introduce it.			

15.Scientific orientation:

Please indicate your response to the following statements in terms of Agree (A), Undecided (UD) or Disagree (DA).

S.No.	Statements	Agree	Undecided	Disagree
1.	Processing of vegetables give better income than traditional methods.			
2.	Processing of vegetables is costly and time consuming.			
3.	A farmer can progress better when vegetables processing is put into practice.			
4.	Processing of vegetables should be done in order to change/raise the standard of living of the farmers.			
5.	Farmer even with lot of experience should use scientific farming techniques.			

16. Economic Motivation:

1.	A farmer should work for economic profits	Agree	Undecided	Dis-agree
2.	The most successful farmer is one who makes more profit			
3.	A farmer should try new idea like processing of vegetables which may give him more money			
4.	A farmer should sell processed food to increase his income.			
5.	It is difficult for farmer's children to make a good start until provided with economic assistance.			
6.	A farmer must earn his living but most important thing in life cannot be defined in economic terms.			
7.	I would hesitate to borrow money to start processing of vegetables			
8.	Instead of routine farm practices I would go for vegetable processing.			

Part 2

Opinion of the farmers about vegetable processing

S.no	Opinion	Agree	Disagree
1.	It requires technical knowledge.	_____	_____
2.	It is a complex process	_____	_____
3.	It requires huge initial investment.	_____	_____
4.	There is lack of equipments required for processing.	_____	_____
5.	Higher cost of construction of processing unit	_____	_____
6.	Lack of storage for processed vegetables.	_____	_____
7.	Higher charge of storage.	_____	_____
8.	Technical skills are required for operating equipments and machines.	_____	_____
9.	It is profitable process.	_____	_____
10.	It increases the market value of vegetable product.	_____	_____
11.	It enhances the shelf life of product.	_____	_____
12.	Processed foods are easy to transport.	_____	_____
13.	Processed foods catches more attraction of the Consumers as it adds flavor to the product	_____	_____

Part 3

Study the problems perceived by the vegetable growers in processing of vegetables.

	Very serious	Serious	not serious
1) Technical problems			
a) Inadequate knowledge about processing of vegetables.	_____	_____	_____
b) Lack of knowledge about machines and equipments. Needed	_____	_____	_____
c) Lack of knowledge and skill in handling of machines.	_____	_____	_____
d) Any other			
(Please specify) _____			
2) Storage problems			
a) Non availability of storage infrastructure	_____	_____	_____
b) High storage charges	_____	_____	_____
c) Unsatisfactory conditions of cold storage	_____	_____	_____
3) Financial problems.			
a) Lack of finance	_____	_____	_____
b) Difficulty in getting loan	_____	_____	_____

c) High cost of equipments involved. _____ _____ _____
d) Any other
(Please specify) _____

4) Marketing
a) Non remunerative price _____ _____ _____
b) Inadequate transport facilities _____ _____ _____
c) Any other
(Please specify) _____

5) Other Problems
a) Non availability of labor _____ _____ _____
b) Lack of time for processing of vegetables. _____ _____ _____

Part 4

Suggestions for overcoming the problems/ constraints in vegetable processing

_____
_____
_____
_____
_____
_____
_____

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