A STUDY ON PESTICIDE BRAND PREFERENCE OF POMEGRANATE GROWER'S IN TUMAKURU DISTRICT OF KARNATAKA

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GKVK, BENGALURU-560065

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Project report submitted to the

University of Agricultural Sciences, Bengaluru

In partial fulfilment of the requirement for the degree of

MASTER OF BUSINESS ADMINISTRATION

(*Agribusiness Management)*

BENGALURU-560065 **AUGUST, 2018**


Affectionately
Dedicated to
My Beloved Parents
Brothers, Friends
& My Guide

DEPARTMENT OF AGRICULTURAL MARKETING, CO-OPERATION AND BUSINESS MANAGEMENT
UNIVERSITY OF AGRICULTURAL SCIENCES
GKVK, BENGALURU-560 065

CERTIFICATE

This is to certify that the Project Report entitled, **"A STUDY ON PESTICIDE BRAND PREFERENCE OF POMEGRANATE GROWER'S IN TUMAKURU DISTRICT OF KARNATAKA"** submitted by **Mr. AJEET NAGARAL., ID No. MBAL 6003** in partial fulfillment of the requirements for the award of the degree of **MASTER OF BUSINESS ADMINISTRATION (Agribusiness Management)** to the University of Agricultural Sciences, GKVK, Bengaluru, is a record of bonafide research work done by his during the period of his study in this University under my guidance and supervision and the project work has not previously formed the basis of the award of any degree, diploma, associate ship, fellowship or any other similar titles.

Bengaluru
August, 2018

Dr. V. Govinda Gowda
Major Advisor

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Bangalore **(Ajeet Nagaral)**

August, 2018

A STUDY ON PESTICIDE BRAND PREFERENCE OF POMEGRANATE GROWERS' IN TUMAKURU DISTRICT OF KARNATAKA

Ajeet Nagaral

Abstract

India is the fourth largest producer and tenth largest consumer of pesticides in the world. Inspite of being one of the largest producer and consumer, the crop losses in India due to pest attack is very high which resulted in huge losses (Rs. 90,000 crores per annum). Keeping this issue in mind the study was conducted in Tumakuru district with the objective of analyzing factors influencing the farmer's brand preference for pesticides. Among the companies selling pesticides in the district, Bayer Crop Science has the highest market share followed by Indofil Industries Ltd. and Hindustan Antibiotics Ltd. The study also analyzed the factors influencing farmers pesticide purchase decision. The study revealed that Long term protection emerged as first consideration followed by Brand popularity and Effectiveness. With regard to the pesticide brand preferred by farmers, majority of farmers (88.89 %) were using Confider followed by Diathin M-45 (81.11 %). The study also revealed that the retailer and dealers suggestions were the most important among the others various factors influencing the purchase decision of farmers. Hence, the companies need to focus more on encouraging the retail traders and employees by motivating them to interact with farmers and provide relevant information required by them to sustain in the business for the long run.

August, 2018 (V. Govinda Gowda)
Department of Agricultural Marketing, Major Advisor
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ಕರ್ನಾಟಕದ ತುಮಕೂರು ಜಿಲ್ಲೆಯಲ್ಲಿ ದಾಳಿಂಬೆ ಬೆಳೆಗಾರರ ಪೀಡೆನಾಶಕ ಬ್ರ್ಯಾಂಡ್‌ಗಳಿಗೆ ನೀಡುವ ಆದ್ಯತೆಯ ಅಧ್ಯಯನ

ಅಜೀತ ನಾಗರಾಳ

ಸಾರಾಂಶ

ಪ್ರಪಂಚದಲ್ಲಿ ಪೀಡೆನಾಶಕ ಔಷಧಿಗಳ ಉತ್ಪಾದನೆಯಲ್ಲಿ ಭಾರತವು ನಾಲ್ಕನೇ ಸ್ಥಾನ ಮತ್ತು ಬಳಕೆಯಲ್ಲಿ ಹತ್ತನೇ ಸ್ಥಾನ ಪಡೆದಿದೆ. ಆದರೂ ಸಹ ಭಾರತದಲ್ಲಿ ಪೀಡೆ ಹಾವಳಿಯಿಂದ ಬೆಳೆಯ ನಷ್ಟದ ಮೌಲ್ಯವನ್ನು ವಾರ್ಷಿಕವಾಗಿ ಸುಮಾರು ರೂ. ೯೦.೦೦೦ ಕೋಟಿಯಷ್ಟಿದೆ. ಪ್ರಸ್ತುತ ಅಧ್ಯಯನವು ರೈತರ ಬ್ರ್ಯಾಂಡ್‌ಗಳ ಆದ್ಯತೆಯ ಮೇಲೆ ಪ್ರಭಾವ ಬೀರುವ ಅಂಶಗಳು ಮತ್ತು ಪೀಡೆನಾಶಕ ಸಂಸ್ಥೆಗಳ ಜಾಹೀರಾತು ಕಾರ್ಯತಂತ್ರಗಳನ್ನು ಕುರಿತು ವಿಶ್ಲೇಷಿಸುವ ಉದ್ದೇಶದೊಂದಿಗೆ ತುಮಕೂರು ಜಿಲ್ಲೆಯಲ್ಲಿ ಈ ಅಧ್ಯಯನವನ್ನು ಕೈಗೊಳ್ಳಲಾಯಿತು. ಈ ಅಧ್ಯಯನದಿಂದ ಕಂಡುಬಂದ ಮುಖ್ಯ ಅಂಶವೆಂದರೆ ಜಿಲ್ಲೆಯ ಪೀಡೆನಾಶಕ ಔಷದಿ ಮಾರಾಟದಲ್ಲಿ ಬೇಯರ್ ಕ್ರಾಪ್ ಸೈನ್ಸ್ ಗರಿಷ್ಟ ಮಾರುಕಟ್ಟೆ ಪಾಲನ್ನು ಹೊಂದಿದ್ದು, ಒಟ್ಟಾರೆ ಪೀಡೆನಾಶಕ ಮಾರುಕಟ್ಟೆಯಲ್ಲಿ ಬೇಯರ್ ಕ್ರಾಪ್ ಸೈನ್ಸ್ ಮೊದಲ ಸ್ಥಾನವನ್ನು, ತದನಂತರದ ಸ್ಥಾನಗಳನ್ನು ಕ್ರಮವಾಗಿ ಇಂಡೋಫಿಲ್ ಇಂಡಸ್ಟ್ರೀಸ್ ಲಿ. ಹಾಗೂ ಹಿಂದೂಸ್ತಾನ್ ಆಂಟಿಬಯೋಟಿಕ್ಸ್ ಸಂಸ್ಥೆಗಳು ಹೊಂದಿವೆ. ಶೇಕಡಾ ೮೮.೯೯ ರಷ್ಟು ರೈತರು ಕಾನ್ಫಿಡಾರ್ ಪೀಡೆನಾಶಕ ಬ್ರಾಂಡ್‌ನ್ನು, ಶೇಕಡಾ ೮೫.೫೬ ರಷ್ಟು ರೈತರು ಡಯಾಥಿನ್ ಎಂ–೪೫ ಪೀಡೆನಾಶಕ ಬ್ರ್ಯಾಂಡ್‌ನ್ನು ಮತ್ತು ಶೇಕಡಾ ೮೧.೧೧ ರಷ್ಟು ರೈತರು ಸ್ಟ್ರೆಪ್ಟೋಸೈಕ್ಲಿನ್ ಬ್ರ್ಯಾಂಡ್‌ಗೆ ಆದ್ಯತೆ ನೀಡುತ್ತಿದ್ದಾರೆ. ಈ ರೀತಿಯ ಆದ್ಯತೆಗೆ ಮುಖ್ಯ ಕಾರಣಗಳೆಂದರೆ ಧೀರ್ಘ ಕಾಲ ಸಂರಕ್ಷಣೆ, ಬ್ರ್ಯಾಂಡ್ ಜನಪ್ರಿಯತೆ ಮತ್ತು ಪರಿಣಾಮಕಾರತ್ವ. ಪ್ರಸ್ತುತ ಅಧ್ಯಯನದಿಂದ ಕಂಡುಬಂದ ಇನ್ನೊಂದು ಮುಖ್ಯ ಅಂಶವೆಂದರೆ ಚಿಲ್ಲರೆ ವ್ಯಾಪರಿಗಳು ಮತ್ತು ಕಂಪನಿ ಪ್ರತಿನಿಧಿಗಳು ಮಾರಾಟದ ಚಟುವಟಿಕೆಯಲ್ಲಿ ಪ್ರಮುಖ ಪಾತ್ರವನ್ನು ವಹಿಸಿರುತ್ತಾರೆ. ಆದ್ದರಿಂದ ಕಂಪನಿಗಳು ಚಿಲ್ಲರೆ ವ್ಯಾಪಾರಿಗಳಿಗೆ ಮತ್ತು ಉದ್ಯೋಗಿಗಳಿಗೆ ಉತ್ತೇಜನ ನೀಡುವುದು ಹಾಗೂ ರೈತರೊಂದಿಗೆ ವಿಶ್ವಾಸದಿಂದಿದ್ದು, ಅವಶ್ಯಕ ಮಾಹಿತಿಯನ್ನು ರೈತರಿಗೆ ತಲುಪಿಸುವುದಕ್ಕೆ ಉತ್ತೇಜಿಸಬೇಕು. ಈ ರೀತಿಯಲ್ಲಿ ದೀರ್ಘಾವಧಿ ವ್ಯಾಪಾರ ವೃದ್ದಿಸಿಕೊಳ್ಳಲು ಯೋಜನೆಗಳನ್ನು ಕಂಪನಿಗಳು ಹಾಕಿಕೊಳ್ಳಬೇಕಾಗುತ್ತದೆ.

ಆಗಷ್ಟ್, ೨೦೧೮ (ವಿ. ಗೋವಿಂದ ಗೌಡ)

ಕೃಷಿ ಮಾರುಕಟ್ಟೆ, ಸಹಕಾರ ಮತ್ತು ಪ್ರಧಾನ ಸಲಹೆಗಾರರು

ವ್ಯವಹಾರ ನಿರ್ವಹಣೆ ವಿಭಾಗ, ಕೃಷಿ ಕಾಲೇಜು

ಜಿ.ಕೆ.ವಿ.ಕೆ ಬೆಂಗಳೂರು– ೫೬೦೦೬೫

Factors Influencing Consumer Preference for Pesticide Brand- A Study in Tumkur District of Karnataka

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Introduction

Pomegranate *(Punica granatum L.)* is fruit tree and has been improved for the purposes of fruit, as well as for ornamental and medicinal usages. It originated in the Middle East (Persia and the surrounding area) and was distributed from the Mediterranean area to East Asia in ancient times (De Candolle 1883).

Pesticides are chemical substances that are meant to kill pests. In general, a pesticide is a chemical or a biological agent such as a virus, bacterium, antimicrobial, or disinfectant that deters, incapacitates and kills pests.

The Indian crop protection industry is estimated to be USD 4.1 billion in 2013 and is expected to grow at a CAGR of 12 per cent to reach USD 7.1 billion by 2018. The exports currently constitute almost 50 per cent of the Indian crop protection industry and are expected to grow at a CAGR of 16 per cent to reach USD 4.2 billion by 2018, resulting in 60 per cent share in Indian crop protection industry. India is the fourth largest producer of crop protection chemicals globally, after United States, Japan and China. The crop protection companies in India can be categorized into three types -Multi-National, Indian including the public sector companies and small sector units. (FICCI, 2014).

Objective

To anaylse the purchase behaviour of pomegranate grower's in respect of pesticide

Methodology

The study was conducted in Pavagad and Sira talukas of Tumkur district.

The data was obtained from 90 farmers - fourty five farmers from each taluka, to study factors influencing farmers pesticide purchase decision.

Analytical tools and techniques employed:

- **The data were analyzed through factor analysis and Kaiser-Meyer-Olkin (KMO) test by using SPSS software.**

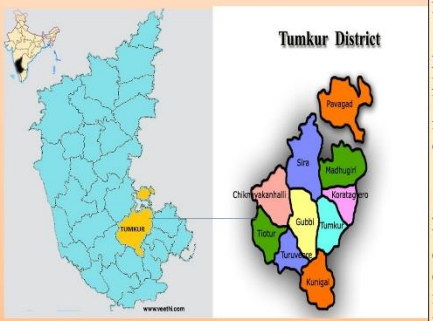

Fig. 1: Map of Tumkur District

Results

Table 1: KMO and Barlett's test for variance among factors

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.648
Bartlett's Test of Sphericity	Approx. Chi-Square	631.43
	Degrees of freedom	136
	Significance level	0

Table 2: Factors influencing brand preferances while buying the pesticides.

Sl. No.	Attributes	Factor 1	2	3	4	5
1.	Long term protection	0.85	0.222	0.044	0.217	0.01
2.	Brand popularity	0.82	0.179	0.132	0.131	0.02
3.	Effectiveness / Good results	0.77	0.027	0.284	0.216	0.13
4.	Recommendation by dealer	0.73	0.458	-0.031	-0.27	-0
5.	Low price	0.66	0.22	0.097	0.498	0.24
6.	Credit availability	0.24	0.847	0.013	0.083	0.16
7.	Timely availability	0.38	0.615	0.435	-0.02	0.02
8.	Previous experience	0.2	0.534	0.361	0.511	-0.2
9.	New product in the market	0.19	0.531	0.198	0.504	0.2
10.	Advertisement by company	0.08	-0.084	0.778	0.047	0.32
11.	Possibility of mixing with other chemicals	0.02	0.149	0.683	0.311	-0
12.	Safe chemicals	0.25	0.506	0.635	0.153	-0
13.	Low pesticide residue	0.45	0.392	0.607	-0.04	-0
14.	Eco-friendly	0.36	0.011	0.085	0.773	0.06
15.	Availability in small quantity pack sizes	0.02	0.345	0.073	0.317	0.75

Discussion

KMO measure was found to be 0.648 indicating degree of common variance is 'mediocre'(Table 1).

Among the various preferences "Long term protection was the major factor which influenced farmers' considerations while buying pesticides (Table 1). Generally, farmers willing to protect their crops from pests and diseases for a long period of time as for as possible and also it decreases the cost of production. Hence, Long term protection of crops were prefered as major factor while buying pesticides for pomegranate orchards.

Apart from Long term protection, pomegranate growers looks at popular brands. It may be becuase of thier previous experience with the particular brand in controlling pests and diseases. Hence, brand popularity emerged as a second major factor which influenced the farmers' considerations for buying pesticides. The other major considerations were effectiveness of pesticides, recomendations by dealers, low prices, credit availability, timely available in a particular season, prevous experience etc.,

Graphs & Photographs

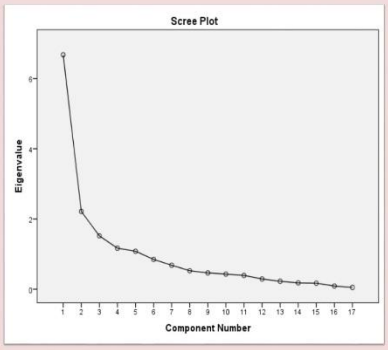

Fig. 1: Catell's screen plot for factor considerations / preference while buying the pesticide

Fig. 2: Pesticide brands

Summary

Among the various preferences "Long term protection" was the major factor which influenced farmers' considerations while buying pesticides, followed by brand popularity effectiveness of pesticides, recomendations by dealers, low prices, credit availability, timely available in a particular season, previous experience were the other important factors influencing the farmer's purchase decision.

Advisory Committee

Chairperson: Dr. V. GOVINDA GOWDA

Members: Dr. B. M. SHASHIDHARA
Dr. C.P. GRACY
Dr. MOHANKUMAR T. L.

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I INTRODUCTION

The **Pomegranate** (*Punica granatum*) is an important fruit crop grown in tropical and subtropical regions of India and is commonly known as Dalim, Anar and Matulum. Pomegranate comes under the family Punicaceae and is a best table fruit of the tropical and sub-tropical regions of the world. The cultivation of Pomegranate was practiced since time immemorial. Generally, pomegranate grows in variety of soils and even survives in alkalinity and salinity in soils. The pomegranate plant begin to bear fruits within one year after planting out, but normal fruit bearing starts after three years.

The pomegranate is very much liked fruit specially as a refreshing juice and also for its medicinal properties. The fruits are also used for desert purpose. Several processed products are also prepared like juice, concentrates, syrups and jelly. The fruit juice easily ferments and is commonly used for the production of wine. The juice of wild pomegranate is used in the manufacture of citric acid and sodium citrate for medicinal purpose. The pomegranate seed contains oil which has a potential for industrial use.

Pomegranate is a sub-tropical fruit. It can be grown in wide range of climatic conditions and can be grown up to 1800 meters above mean sea level. The fruit tree grows well in semi-arid climate with cool winter and hot dry summer. This tree requires hot and dry climate during fruit development and ripening period. The optimum temperature of 38°C required for fruit development. The tree will produce sweet fruits if the temperature is high for a long period. In tropical and sub-tropical climate, it acts as an evergreen or partially deciduous tree. In humid conditions, the sweetness of fruit is badly affected. Therefore, pomegranate is considered as a hardy tree and can perform well under drought conditions, though yield is low. In the areas of low temperature, the plant will bear well only when provided with good irrigation. The tree is deciduous in nature and sheds its leaves during winter months. It is also considered as winter hardy fruit tree.

India is the world's massive producer of pomegranates, followed by Iran. Other countries like Turkey, Spain, Tunisia, Morocco, Afghanistan, China, Greece, Japan, France, Armenia, Cyprus, Egypt, Italy and Palestine also cultivate this product. At

present, good-quality pomegranates come from Turkey, Iran, Afghanistan, Syria, Morocco and Spain. In India, pomegranate is cultivation can be seen in the states of Maharashtra, Gujarat, Karnataka, Tamil Nadu, Uttar Pradesh, Haryana and Andhra Pradesh. The commonly grown cultivars in India are Alandi, Dholka, Kabul, Kandhari, Muskat red, Vellode, Ganesh, G-137, Jyoti, Mridula, Phule Araktha and Bhagwa.

In India, pomegranate occupies an area of 208.73 thousand hectares with the production of 2442.39 thousand million tons and productivity 11.70 million tons per hectare. Maharashtra was ranked first in the production of pomegranate followed by Karnataka, Andhra Pradesh, Gujarat, Rajasthan and Tamil Nadu. Bhagwa, Ganesha, Arakta, Mridula and Ruby are the different varieties with an annual production of around 4.0 to 4.5 lakh tons in the country.

In Karnataka, pomegranate occupies an area of 28.09 thousand hectares with the production of 328.92 thousand million tons and productivity 11.71 million tons per hectare. The predominant pomegranate growing districts are Chitradurga, Tumakuru, Koppal, Bagalkot, Vijayapur, Raichur, Belgaum, Bellary and Dharwad. In Tumkur district, Pomegranate is being grown on commercial scale. The area under pomegranate in the district is 3328.10 ha with the production of 35.40 thousand tons with the productivity of 10.64 tons per hectare.

1.1 Pesticides

Pesticides are chemical substances that are meant to kill pests. In general, a pesticide is a chemical or a biological agent such as a virus, bacterium, antimicrobial, or disinfectant that deters, incapacitates and kills pests.

The term use of pesticides is so common that the term pesticide is often treated as synonymous with plant protection product. It is commonly used to eliminate or control a variety of agricultural pests that can damage yield and livestock and reduce farm productivity. The most commonly applied pesticides are insecticides to kill insects, herbicides to kill weeds, rodenticides to kill rodents, and fungicides to control fungi, mold and mildew.

1.2 Types of pesticides

1. Insecticides: Insecticides provide protection to the crops from the insects by either killing them or by preventing their affect. They help in controlling the pest population below a desired threshold level.

2. Fungicides: Fungicides protect the crops from the infect of fungi and can be of two types - protectants and eradicates. Protectants prevent or inhibit fungal growth and eradicates kill the pests on application.

3. Herbicides: Herbicides also called as weedicides are used to kill undesirable plants. They can be of two types - selective and non-selective.

4. Bio-pesticides: Bio-pesticides are new age crop protection products manufactured from natural substances like plants, animals, bacteria and certain minerals. They are eco-friendly, easy to use; require lower dosage amounts for same performance as compared to chemical based pesticides.

5. Others (Fumigants, Rodenticides, Plant growth regulators etc.): Fumigants and rodenticides are the chemicals which protect the crops from pest affects during crop storage. Plant growth regulators help in controlling or modifying the plant growth process and are usually used in cotton, rice and fruits.

1.3 Indian Pesticide Industry

The Indian crop protection industry is estimated to be USD 4.1 billion in 2013 and is expected to grow at a CAGR of 12 per cent to reach USD 7.1 billion by 2018. The exports currently constitute almost 50 per cent of the Indian crop protection industry and are expected to grow at a CAGR of 16 per cent to reach USD 4.2 billion by 2018, resulting in 60 per cent share in Indian crop protection industry. India is the fourth substantial producer of crop protection chemicals globally, after United States, Japan and China. The crop protection companies in India can be categorized into three types -Multi-National, Indian including the public sector companies and small sector units. (www. ficci.in/SEdocument/20276/report-India-Risk-Survey-2014.)

India due to its inherent strength of low-cost manufacturing and qualified low-cost manpower is a net exporter of pesticides to countries such as USA and some

European and African countries. Exports formed 47 per cent of total industry turnover in 2013.

The industry suffers from high inventory (owing to seasonal and irregular demand on account of monsoons) and long credit periods to farmers, thus making operation of 'working capital' expensive.

1.4 Pesticide entry to India

The acute food shortage during Bengal famine of 1943 (Famine Commission-1945) was mainly due to brown leaf spot disease. The commission suggested the establishment of comprehensive organization for effective control of pests and diseases. Based on commission's recommendation during May 1946, The Directorate of Plant Protection, Quarantine and Storage (Directorate of PPQ&S) was established in Faridabad.

The Government of India through the Directorate of PPQ&S initiates, plans, supports and encourages innovative programmers and activities such as quality control of pesticides, use of bio-control agents, integrated pest management encompassing surveillance and monitoring etc. To monitor sale and use of pesticides, the imports/exports, manufacture, safe transport, the central government in co-operation with state governments implements the Insecticides Act, 1968, through the Central Insecticides Board and Registration Committee. DDT was used for the first time in India in 1947 to control malaria. In agriculture, the usage of pesticides started in 1949 with the use of BHC to control locusts.

1.5 Pesticide utilization in India

The consumption of pesticides in India was one of the lowest at 0.032 kg/ha during 1954-55. During 1966, the year of introduction of high yielding varieties of rice and wheat, the usage of pesticides reached 0.094 Kg/ha. The consumption of pesticides per hectare was 550gms in 2003-04 which was scarcely higher than the African countries' consumption. (*pesticideassociation.com*.)

The role of pesticides in crop production is significant as it a protective umbrella for alternative inputs. A crop might be infected by a number of pests, at

different stages of growth of crop but virulence varies widely. The loss sustained by the crop depends upon the extent of pest attack. If the affect is of epidemic nature, the crop failure may be total in spite of all other inputs substance optimal. Timely and judicious apply of pesticides can retain the crop from like disasters management in (Joshi, 2002).

1.6 Brand preference for pesticides

Pesticides also known as Agrochemicals. “Dawai” as the farmers call it, had a very confined to brand preference and their awareness was very confined in terms of brands and companies. Regional agrochemicals companies like GSP Crop Science, Chemet Chemicals and Excel Crop Care dominated the Surat belt, while leading companies like Bayer Crop, Rallis India and Syngenta were conspicuously absent. Among Pan-India players, They could see products of PI Industries and United Phosphorus Ltd (UPL) presence sold in most of the depots. Another noticeable observation was that agrochemicals sales are done mostly on credit and a farmer pays back at the end of season from the sale proceeds of his crop produce.

1.7 Farmers purchasing behaviour on pesticides product

The job of marketer is to meet and satisfy target customers" needs and wants but “knowing customer" is not a simple task. Understanding the purchasing responsible of the target market for its company products is the essential task for the marketing dept. The job of the retailer is to “think customer” and to guide the company into developing offers, which are meaningful and attractive to target customers and creating solutions that deliver satisfaction to the customers, profits to customer and benefits to the stakeholders. Marketers must study the customer taste, preferences, wants, shopping and purchasing behavior because such a study provides the clues for developing the new products, price, product range, messages and other marketing mix elements. Consumer is the king and hence, it is the consumer who determines what a business is, therefore a sound marketing program is to be started with a careful analysis of the habits, attitudes, motives and needs of consumers.

In today’s world purchases made by a customer is to satisfy his or her needs. All the behavioral activities carried out by a customer during and after the purchase of a product are termed so as “buyer behaviour”.

1.13 Market share of different brands of pesticides

Indian crop protection industry is capital intensive and highly standardized industry. The industry has been mainly composed of technical grade manufacturers and formulators. The technical grade producers usually sell premium quality chemicals in the bulk to the formulators, who then prepare formulations by mixing the carriers, solvents, surface active agents and other relevant compounds. There are nearly 125 technical grade manufacturers, about 800 formulators and more than 1,45,000 distributors involved in the chain. UPL was observed to be the leading player in the country's business of agro-chemicals in finical year FY'2013. The company's rich portfolio includes products such as Lancer Gold, Ulala, Saaf, Saathi, Lagaam and others. Bayer Crop Science is the second highest player in the crop protection market in India. The company has led a major role towards driving innovation in the market to improve agrarian productivity. Bayer Crop science recorded a significant market share in the overall pesticides market in India.

1.14 Special features of the study

India is the fourth massive producer and tenth huge consumer of pesticides in the world. Inspite of existence as one of the massive producer and consumer, the crop losses in India due to pest infection has resulted in huge damage (90,000 crores per annum). Brand preference plays an predominant role in purchase behavior of farmer-consumer. Pesticide purchase decision is influenced by various factors viz. effectiveness/ consideration preferences, low price, long term protection of the crops, brand popularity, credit availability etc. have impact on pesticide market and it is foremost in deciding market share for different brands of pesticides in agrochemical market. With this background it is contemplated to study the Pesticide Brand Preference of Pomegranate Growers' in Tumakuru District of Karnataka.

1.15 Specific objectives of the study

i. To study the pesticides brand preference of Pomegranate farmers.

ii. To evaluate the factors influencing farmer's pesticide purchase decision.

iii. To study the market share of different brands of pesticides in the district.

1.16 Hypothesis

a. Pomegranate farmers are not loyal to pesticide by their brand

b. Price of the pesticide is the major factor influencing pesticide purchase choice

c. Pesticide market is highly concentrated

1.17 Limitations of the study

The study is based on both primary as well as secondary data. Primary data was collected from the sample farmers by survey method. of the farmers have furnished the required information from their memory and experience, the collected data would be subjected to recall bias. The study area was restricted to Pavagada and Sira taluk of Tumkur district and the findings may not be appropriate to other markets, as vast difference exists with regard to demographic and topographic characteristics. Hence, the findings of the study are confined to these constraints.

1.18 Organization of the study

The study has been organized into seven chapters as indicated below

Chapter I Deals with introduction covering the Pomegranate production aspects pomegranate pesticides status in India, development, global scenario, of pesticides Indian scenario, production and consumption of pesticides Objective and limitation of the study and significance of the study.

Chapter II Pertains to Review of Literature, which are presented inconsonance with the study objectives.

Chapter III Describes main features of the study area, sampling framework, database and analytical tools employed in the analysis of data.

Chapter IV Deals with results, interpretation and discussion of the study with table and graphs

Chapter V Summarizes the major findings of the study and policy implications.

Chapter VI Reference chapter provides the list of literature referred for the present study.

II REVIEW OF LITERATURE

Review of the past research forms an integral part of any systematic research. It helps in identifying the conceptual and methodological issues relevant to the study. It contributes to the understandings of issues involved, analytical tools adopted, sampling and other relevant information needed for the research work. Only a few studies were available on brand preference of pesticides by farmer, reasons for preferring the particular pesticide brand and choice for retail shop. Therefore, closely related and relevant studies to the present investigation were reviewed and are presented under the following headings.

2.1 Pesticides brand preference of pomegranate growers

2.2 Factors influencing the farmers purchase decision of pesticide brands

2.3 Market share of different brands of pesticides

2.1 Pesticides brand preference of farmers

Nezakati *et al.* (2001) conducted the study with the aim of examining how the respondent's perception would be influenced by characteristics of Malaysian customer loyalty and made innovative change to keep track towards preferred fast food restaurants. The findings of this study indicated that product quality, customer satisfaction and brand trust was the dominant variable that drive the customer loyalty to preferred fast restaurants.

Topcu and Uzundumlu (2009) studied with the aim of determining the salient attributes affecting customer retailer loyalty in Turkey. The results showed that satisfaction with the product and store image in cluster 1, satisfaction with the sales process and perceived service quality in cluster 2, and variety seeking in Cluster 3 were the most prominent retailer attributes that affected consumer retailer loyalty.

Dharmaraj and Clement (2010) examined the brand preference for passenger cars and identified four main consideration influencing the brand preference. Information on factors like advertisement, dealers schemes, salesmanship, internet, friends and relatives past experience was considered to be the first main characteristic

followed by psychological characteristics like social status, image of manufacturer, celebrity endorsements, brand loyalty, style and driving comfort etc. Economic attributes like price, disposable income, easy finance, discount offers, maintenance cost, free insurance resale value etc. and finally the last product attribute like quality, comfort, road grip, luxury, warranty, space, power break and steering etc., were the four major consideration influencing the customers for preferring a particular car brand.

Schwarzova and Stojarova (2011) analyzed the customers in the agricultural machinery market and their loyalty to each brand in the Czech Republic. The result found that loyalty for just one brand in the agricultural machinery market. For John Deere brand, there was proven the loyalty-subjects perceiving the mark as the best in the market, also buying it the results can help for our future analyses to understand characteristics influencing the market and analyses of each brand, and how their strategy in the market is conformed to the subject perception and behavior.

Venkateswaran *et al.* (2011) examined the brand preference of selective household article brands at Dindigul, Tamil Nadu. The study revealed that advertisement, quality of product brand name and image of the product were the major attributes influencing the customers to prefer a particular brand.

Jain *et al.* (2012) conducted a study in Garhwali of Uttarakhand on brand awareness in rural area and interest of consumers in branded products of Fast Moving Consumer Goods (FMCG). They found that the brand awareness was showing increasing tendency everywhere particularly in Garhwali Region of Uttarakhand state

Bharatharaj (2012) assessed the farmers' buying behaviour towards pesticide and the role of dealers in marketing the products. (with reference to Coimbatore district) From the buying behaviour of farmers, it was revealed that 65.34 per cent of farmer's source pesticides and other farm inputs from authorized private brand dealers, 52.80 per cent of the agriculturists buy pesticides and other farm inputs on both cash and credit basis. 67.50 per cent had said that they were inclined to change the buyer sources of pesticides due to want of credit. 64.80 per cent sample agriculturists in the study region had said that they prefer to stick to the same brand and used same quantity of pesticides even if its prices change in the market operations and 37.07 per cent have

said that they always tended to be loyal with both the brand and dealer of particular pesticides in their geographical location.

Chrysochou *et al.* (2012) examined the role of quality assurance labels as drivers of customer's loyalty in the case of traditional food products in France. More specifically, it investigated whether quality assurance labels, such as the Designation of Origin Labels (DOLs), perform as better drivers of loyalty in comparison to other brand-related attributes, such as price and brand type, and if brands carrying a designation of origin labels exhibited higher loyalty levels in comparison to brands that do not carry any DOL label. The findings show that in comparison with other extrinsic product attributes, DOLs constitute less important drivers of loyalty. However, brands carrying a DOL in comparison to brands that do not carry any DOL label exhibit higher levels of loyalty.

Hyeon Suk and SeoungKyu (2012) measured the relationship between brand equity and rice purchase decision in Seoul concluded promotion strategies involves two key decisions: the percentage reduction in price from the existing price point, and the frequency with which a product was promoted. These decisions, in turn were critically dependent upon how many consumers could be convinced to switch to a brand by temporarily reducing its price, and how many were instead brand loyal. Theoretical models of how the strength of brand loyalty influences optimal promotion strategies haved been developed. Results confirmed that retailers promote strong brands shallower and more frequently compared to brands with weak loyalty.

Kumaresh and Praveena (2012) conducted a study on farmer's attitude and brand preference of bio inputs with special reference to bio fungicide in Erode district. The survey was conducted for 8 revenue villages of Gobichettipalayam taluk. Totally 120 farmers were selected for the study by simple random sampling method and thirty dealers were selected. Dealer/ field officer was found to be the major source of information in the study area followed by neighbors' and radio/ television. It indicates that the farmers developed a good rapport with the dealers over a long period and relied more on them for getting information related to bio inputs. Farmers relied more on the field officers and dealer's prescription for the problem in crop protection and field officers.

Yun *et al.* (2012) investigated the influence of expectations and evaluation of functional and social attributes on Indian consumer's food retail loyalty. Structural equation modeling results indicated that social self-congruity was an important determinant of food store patronage in India. Food assortment and services was critical drivers of supermarket loyalty, whereas relative advantage was the only determinant of store lead to increased store commitment and perception of greater relative advantage for traditional retail shoppers, whereas positive store experiences increase switching costs for supermarket customers.

Bruwer and Buller (2013) conducted study on the level of product involvement, brand loyalty, and preference for country-of-origin wine brands of Japanese wine consumers. Regression analysis on brand loyalty and involvement by the age demographic, and increased with age until the 35-45-year age group (Generation-X) and then slowly decreased. A strong positive relationship existed between consumption frequency and quantity, and the level of involvement. High involvement consumers show a strong preference for old world produced wines, mainly from France and Italy.

2.2 Factors influencing farmer's pesticide purchase decision

Nandagopal and Chinnaiyan (2003) conducted a study on brand preference of soft drinks in rural Tamil Nadu, using Garrets ranking technique, to rank attributes influencing the soft drinks preferred by rural consumer. They found that, the product quality was ranked as first, followed by retail price. Good quality and availability were the main consideration, which influenced the rural consumers of a particular brand of a product.

Narang (2006) opined that, a buyer did not stick to one brand. They should be able recall different brand names when they went for purchase. Repetitive advertising could be used to promote brand recall. The product should be associated with style and trend, so that it appealed to the youth and the brand name should be developed as a fashion statement. Promotional schemes such as discounts and free offers with purchase were suggested to increase rates.

Vincent (2006) found that quality was an important factor that drawed consumer towards branded products. Branded products were accepted as good quality products. People did not mind paying extra money for branded products, as they got

value for money. Media is a key constituent in promoting and influencing brand. A child's insistence affects family's buying behaviour. Children are highly aware and conscious of branded products, customers would still prefer to purchase branded products.

Mahantesh and Singh (2009) studied farmers' knowledge and perceptions on pests and pesticide use in vegetable cultivation and analysed the pesticide use practices and the intensity of pesticide use in vegetable cultivation. The result shows that on an average 41 per cent of the farmers were aware of pesticide hazards in vegetable cultivation. Most of the farmers (88 %) perceived that frequency of insects and disease infestation has increased over the past 10 years. It was also observed that farmers had not followed adequate safety measures regarding pesticide application. High pesticide use cost was observed in vegetables especially in tomato and brinjal and most of the pesticides belonged to high and moderate risk chemicals. Increasing farmers' awareness of pesticide hazards to the environment and promotion of alternative pest management strategies such as use of bio-pesticides and IPM was recommended by the authors for reducing adverse effect on environment.

Rahman (2009) analyzed the market share of mineral water. The study was conducted at Barisal metropolitan city area in Bangladesh to determine the market share of branded mineral water. For this purpose, the Barisal metropolitan city was divided into 10 areas with 10 randomly selected retail outlets in each area. It was found that Fresh 1 liter is the market leader, occupying a 10.56 per cent market share in the overall market based on sales turnover in taluk, while Fresh 0.5 liter occupies a 13.86 per cent market share based on sales turnover in quantity. The company-wise market share analysis, showed that Partex Beverage Ltd. is the market leader, holding a 29.47 per cent market share, followed by United Water and PET Industries Ltd. (27.99 %), Acme Agro vet and Beverages Ltd. (15.22 %), Pran Foods Ltd. (11.80 %) and City Pet Industries Ltd. (8.05 %), Akij Food and Beverages Ltd. take a market penetration strategy to hold its leading position.

Bardhan (2010) study was carried out in Tarai region of Uttarakhand, with the objectives of ascertaining consideration influencing farmers' willingness to pay for animal health services (AHS) and preference for private veterinary practitioners. The findings of the study revealed that para-veterinary staff compared poorly with private

and government veterinarians in regard to quality of services provided. Indeed, quality was perceived by vast majority of farmers as their most preferred attribute of AHS. Price as an attribute was rated quite low compared to quality and even other attributes like proximity, which implied that if quality AHS is guaranteed, price is not an important determinant in the farmers' uptake decisions. The findings also revealed that the preference for private veterinarian increased with the wealth status. Risk attitude was also found to influence choice of AHS provider. Risk adverse farmers preferred government veterinarians while risk taking farmers showed a tendency to prefer private practitioner. The overall findingswere that there are variations in the valuation of AHS attributes – price being only one of them - that cause farmers belonging to different wealth categories to prefer different AHS providers.

Dharmaraj (2010) examined brand preference for passenger cars. The study divided three main attributess influencing brand preference. First Information consideration like advertisement, dealer's schemes, salesmanship, internet, friends and relatives past experience. Second main consideration psychological factors like social status, image of manufacturer, celebrity endorsements, brand loyalty and name, style and driving comfort etc. Economic factor like price, disposable income, easy finance, discount offers, maintenance cost, free insurance resale value etc. Last product consideration like quality, comfort, road grip, luxury, warranty, space, power break and steering etc. conducted a Meta-analysis for passenger cars.

Chalwe (2011) studied the factors influencing bean producers' choice of marketing channels in Zambia. The results of study indicate that, beans is a countrywide grown crop with the majority of it produced in Northern Province. The size of farmers highly engaged in beans production are small scale by nature representing 82 % with the majority producing less than 0.5ha and non-mechanized. Majority of beans farmers participated in its marketing. However, although analysis revealed that a good number of farmers owned some form of transport and livestock, majority sold quantities of above 100 kgs on less than 1km, and that most of the transactions took place at their homestead to other households. Among the market factors the two price modes (price in kwacha and barter price) were the only factors influencing both decision to sell and choice of marketing channel. Study concluded that policy makers should focus more on small scale farmers if production of beans in

Zambia is to enhance, this can also be proved from the provincial production amounts which vary significantly and the knowledge that small scale farmers are found in all provinces leading to countrywide malnutrition eradication, increased income among households and eventually national development.

Lohana (2011) analysed the marketing strategy adopted by Syngenta India company and its impact on consumer buying behaviour in Nanded city. The study revealed that big farmers were less brand conscious, and showed low product loyalty. A majority of farmers were keen in trying out new agrochemical products and techniques to prevent pests building resistance to specific chemical. The rest of them waited until there was decline in performance before changing their products/ brands. Critical success factors in determining the choice of the product were company name (33 %), farmer's recommendation (41 %) and dealer's recommendation (11 %) while launch of new chemicals and trial pack result influenced to a smaller extent. The parameters which were rated in the order of importance by customer's choice indicated that good quality of pesticide from company (37 %), brand name of company (33 %) and word of mouth by fellow farmers (23 %) which helps them proper utilization of chemicals in their field. It was suggested that Syngenta take advantage of the rising popularity among the farmers through audio visual medium/ meetings and print medium.

Venkateswaran *et al.* (2011) examined the brand preference of selective household brands FMGC's at Dindigul, Tamil Nadu. The study observed that in forming tendency of customers to prefer a particular brand, the market variables like advertisement, quality of product, brand name and image plays essential role. So a market must understand how consumer made the purchase decision towards the brand. And also observed factors influence the consumer to go for purchase decision.

Singh (2015) conducted a study on pesticide product promotion and factors influencing farmer's choice of pesticides for paddy crop in Kelwara region Rajasthan. Convenience sampling was used for selecting 150 farmers and seven dealers. Study concluded that UPL, Excel, and PI were the major players for paddy crop in the study area. Total market size was Rs.306 lakhs of which market sizes of Excel crop care was about 21.57 per cent. Field problem occurrence in the study area on the basis of farmer's opinion revealed that 54 per cent by fungus followed by 30 per cent insects and 16 per cent weeds. Company name, quality, application method of product and

dealer's recommendations were the most preferred factors of farmers' preference for brand selection. Demonstrations, farmer's meeting, and individual contacts were the most preferred promotional activities. Margin was the most important for dealers while unexpected rewards had least influence.

2.3 Market share of different brands of pesticides

Udaya (2002) studied that pesticide marketing in Karnataka and found that the market concentration was least in pesticides sales with top 10 firm's market share amounting to 25.5 percent and the market was highly competitive rather than concentrated.

Behr (2008) studied the market for vegetables. The 2007 growing season saw some 33.2 million tonnes of tomatoes processed worldwide, more than the previous year but below the record of 35 million in 2004-05. Other processing crops, such as asparagus, sweet corn, and peas, were affected by unfavorable weather in China, France, Hungary, Spain, Belgium and the UK. Open-ground production in central Europe was higher than elsewhere in the continent. The harvests in Poland and the Czech Republic were up by 12 per cent and 3 per cent. Exports from Spain were down, those from the Netherlands little changed. Germany was Europe's leading importer of fresh produce but also an increasingly significant producer of asparagus. Discount retailers' market share rose to 52 per cent of vegetables purchased.

El Sawalhy *et al.* (2008) analyzed the Egyptian grapes market shares in the world markets. The main exporting countries of grapes through the period 2001-06 were Chile, Italy, South Africa, Netherlands, Turkey, Spain and Greece. While the main importer countries through the same period were Germany, UK, the Netherlands, France, Belgium and Saudi Arabia. The exported quantities of the Egyptian grapes were still 1.4 per cent of the total grapes production through the period 2001-06. This study aimed to identify the main factors affecting foreign countries' imports of the Egyptian grapes.

Aijaz Ali Khoohar *et al*. (2008) made a study on empirical analysis of pesticide marketing in Pakistan. The study investigated pesticide import trends, marketing margins and incentives of various intermediaries, price index of common insecticides and total outlay of farmers on the purchase of pesticides in Pakistan. Estimates of the

quadratic regression model revealed steeper growth trend as compared to that of simple liner regression model. Local companies offered high profit margins up to (30 %) and incentive multinational companies (15 %). MNCs imparted effective training programmers for the capacity building of farmers and dealers.

Weber (2008) studied the Management of brands in case of apple industry in Switzerland and found out that the active use of brand names and branding (Club varieties) in the apple industry was relatively recent. It was estimated that the number of branded varieties in the EU was 4 in 1997, 20 in 2007 and predicted 35 in 2012 with a volume of 420 000 tones or 5 per cent of total marketed share. Apple varieties have product cycle as any other product and data show that the top-5 varieties with 81 per cent market share 35 years ago have only 15 per cent today. The boom varieties of the early 2000s, Gala and Braeburn, were not expanding as fast as they used to. In Switzerland new consumer's brands like Diwa and Mairac were an attempt to improve Swiss production and consumption. New varieties Milwa, La Flamboyante and Galmac had promising potential but it was too early to decide if they were succeed within the consumer brands Diwa and Mairac.

Zhang Han *et al.* (2008) in their analysis on the change of China's plywood used the constant market share model to carry on the causation analysis on the continual growth of China's plywood export from market scale, market distribution and competitive strength during 1992-2006. The conclusions indicated that the increase of export competition played the most important role in the augment export of China's plywood; the positive effect of market scale had increased in a certain, but still not obvious; and the market distribution effect embarrassed the export, although its exportation hindrance function reduced gradually.

Shivakanth (2011) analyzed the market share of Nokia mobile. The study was conducted to know the Nokia's shrinking market share in India. The study revealed that misinterpretation of market trends and customer needs were the reasons for the Nokia's market share to go down, advancement in technology, innovative products, economy of scale, could let Nokia company to surpass the competitor's and maintain its market leader position.

III METHODOLOGY

In this chapter, detail account of research design is discussed. The information on agro climatic and economic features of the study area, database and analytical tools and techniques used for data analysis is provided. This information is presented under the following broad headings:

3.1 Locale of the study

3.2 Description of the study area

3.3 Sampling procedure

3.4 Nature and sources of data

3.5 Analytical tools and techniques employed

3.1 LOCALE OF THE STUDY

3.1.1 Selection of the district

Tumkuru district of Karnataka was selected for the study because the district is one of the major producers of pomegranate and also, pomegranate is gradually becoming a popular fruit crop with the farmers of Tumkuru district because of frequent droughts and consequently the failure of seasonal crops. Pomegranate is an important fruit crop of the district with an area of 3328.10 ha and production of 35.40 thousand tonnes, respectively (*Appendix II*).

3.1.2 Selection of taluks

Out of 10 taluks in the district, two taluks namely Sira and Pavagada were selected based on the criteria of maximum area under pomegranate cultivation. Sira and Pavagada taluks of Tumkuru district had 2,124 and 569 hectares of area under pomegranate, contributing to 63.82 and 17.10 per cent of the overall pomegranate cultivating area in the district, respectively (*Appendix III*).

3.1.3 Selection of villages

Three hoblis from each selected taluk were selected randomly by considering number of pomegranate growers available. Totally six hoblis were selected namely Gowdagere, Hulikunte, Sira kasaba hoblis from Sira taluk and Nidagal, Y. N. Hosakote, Pavagada kasaba hoblis from Pavagada taluk.

3.1.4 Selection of respondents

A sample of 90 farmers from both the taluks were selected by using random sampling technique. From each hobli, fifteen farmers were selected, thus, making a total sample size of 90 farmers from 6 hoblis. Comprises of 45 farmers from each taluk (Table 1).

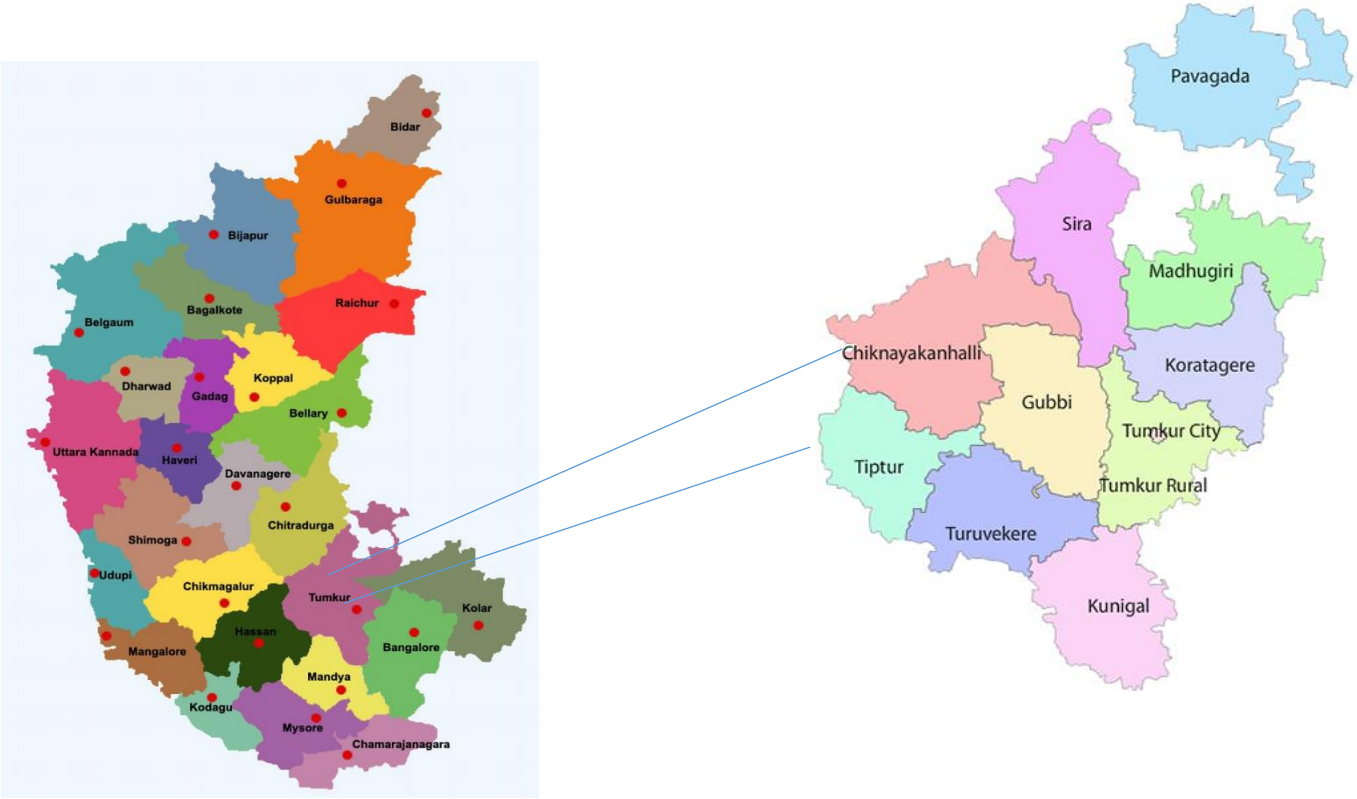
Table 1: Details of taluks, villages and respondents selected for the study

District	Taluks	Hoblis	Respondents
Tumkuru	Sira	Gowdagere	15
		Hulikunte	15
		Sira kasaba	15
	Pavagada	Nidagal	15
		Y.N. Hosakote	15
		Pavagada kasaba	15
Total	2	6	90

3.2 DESCRIPTION OF THE STUDY AREA

3.2.1 Location

The Tumkuru district lies between 12^0 44' to $14^0$20' north latitude and 76^0 20' to 77^0 31' east longitude. The district has peculiar shape in the Pavagada taluk, totally detached from the remaining area of the district. This taluk is surrounded on all sides by



Karnataka state **Tumkuru district**

Fig. 1: Locale of the study

area belonging to Andhra Pradesh except for a short stretch of land on the western border touching Chitradurga district. The remaining portion of Tumkuru district is bound on the north by Andhra Pradesh and Chitradurga, on the east by Bangalore Rural and Chikkaballapura districts, Mandya on the south, Ramanagara on south-east and Hassan on the west. Chikkamagalur too shares its border on the west for short distance (Fig. 1).

3.2.2 Demography

The total population of the Tumkuru district is about 26,78,980 with male and female population of 50.41 per cent and 49.59 per cent, respectively. About 77.64 per cent and 22.36 per cent of the total population belonged to rural and urban populations, respectively. In Tumkuru district, cultivators form 37.35 percent and agricultural labourers form 26.01 percent, which highlights that agricultural activity is predominant in the district. In that, the number of marginal holdings below one hectare and small holdings of size one to two hectares constitute 74.50 per cent of the total holdings. Only 1.05 per cent holders own land more than ten hectares (According to District Census Handbook, 2011, Tumkuru).

3.2.3 Rainfall and Climate

The district falls under central dry, southern dry and eastern dry agro climatic zones of the State. The taluks of Tiptur, Chikkanayakanahalli, Sira, Madhugiri and Koratagere fall under central dry zone. The taluks of Pavagada, Gubbi and Tumkuru fall under eastern dry zone. Turuvekere and Kunigal taluks falls under southern dry zone. The average rainfall in the district ranges from 622 mm in Pavagada taluk to 901 mm in Tumkuru taluk. Among the taluks in the district the pre-monsoon rainfall contributes 17 to 23 per cent of the annual rainfall, south west monsoon contributes 45 to 56 per cent and north east monsoon contributes 25 to 32 per cent of the annual rainfall.

The climate of the district is generally agreeable. However, the climate surrounding Pavagada region and north of Sira, is relatively hot. The year may be divided into four seasons. The district experiences continuous rise in temperature during the months of March to May and April is usually considered as hottest month. Maximum temperature may reach 40^0 or 41^0 C during the hot season. Southwest

monsoon sets in during the period of June to September. In this season, the temperature drops appreciably and the weather is pleasant throughout the season. October and November may be termed as post- monsoon season and during the period temperature decreases steadily and remains cool till February. Winter sets in December and prolongs up to February. December is generally the coolest month of the year and the daily minimum temperature in this season sometimes reaches 9^0 to 10^0 C (According to District Census Handbook, 2011, Tumkuru).

3.2.4 Soils

The soil in the district is generally hard and less fertile. More commonly seen in the district are red soil, black soil and sandy soil. The red soil also known as ragi soil is seen in southern and western taluks, while the black soils in northern taluks and sandy soils in eastern tract are spotted in the district. The red soil is found in the taluks of Tumkuru, Madhugiri, Pavagada, Tiptur, Turuvekere, Kunigal and Gubbi. Especially in Tumkuru, Kunigal and Sira, the soils are red loams and are 2 to 5 feet fairly deep. The red and red loamy soils are suitable for graining a wide variety of crops with manuring and proper irrigation. These soils occur in regions of medium rainfall ranging from 25 inches to 60 inches. The black soil is more suitable for cultivation of cotton crops is found in large extent in Madhugiri taluk. This type of soil is also found in Sira, Chiknayakanahalli, Gubbi, Tiptur, Turuvekere and Pavagada taluks (According to District Census Handbook, 2011, Tumkuru).

3.2.5 Crops

Ragi is most extensively cultivated food crop of the district. The total area put under cultivation of ragi roughly constitutes one-third of the total cropped area. Paddy, maize and jowar are the other important crops are being raised in the district. The major oil seeds grown in the district are sunflower, castor, groundnut, niger seeds besides rape and mustard, sesamum and soybean. Cotton, sugarcane and tobacco are the commercial crops raised in the district. Coconut, mango, grapes, pomegranate, brinjal, potato, banana, tomato, papaya and cabbage are some of the plantation and horticultural crops cultivated in the district. Among condiments and spices, the district is known for dry chillies, dry ginger, coriander, black pepper and garlic (According to District Census Handbook, 2011, Tumkuru).

3.3 Sampling procedure

Tumakuru district was purposively selected for the study to examine farmers' preference for pesticide brands since pomegranate is gradually becoming a popular fruit crop with the farmers of Tumkuru district because of frequent droughts and consequently the failure of seasonal crops. Tumkuru district stands medium in production and productivity in the state and also the area is known for intensive usage of pesticide for cultivation of fruits. Another important factor to consider Tumkuru district for study in that the district is highly potential for the pesticides business. From the district, two taluks, viz., Pavagada and Sira taluks were selected. Pomegranate crop has major cropping area in the district and farmers have to depend on pesticides to protect the crop from pests and diseases.

The data was obtained from ninty (90) farmers – fourty five (45) farmers from each taluka. Further thirty (30) pesticide dealers – fifteen (15) dealers from each taluka were selected. For the study, interview schedule was developed and primary data from farmers and retailers were collected. Further, relevant information was collected from various journals and websites.

3.4 Nature and source of data

In order to evaluate the objectives of the study, the data was collected from both primary and secondary sources.

Primary data was collected from both farmers and retail trader respondents with respect to pesticides brand preference for Pomegranate from farmers, factors influencing farmer's pesticide purchase decision, market share of different brands of pesticides in the study area.

The secondary data regarding cropping pattern, land utilization, general information of district and area under cultivation was collected from the website of Department of Agriculture, Tumkuru (District at a glance). Secondary data was also collected with different company sales executives regarding pesticide sales for the year 2017-18 to estimate the share of different pesticide companies and their brands.

3.5 Analytical tools and techniques

3.5.1 Descriptive statistics

The information collected from Pomegranate growers and retailers was analyzed by computing averages and percentages. This approach was used for the analysis of the market share of different companies. Brand preference including brand awareness were tabulated, computed and presented meaningfully in terms of percentages. The share of each firm was worked out as percentage to total. Tabular analysis was also used to examine purchase pattern, sales pattern and factors influencing purchase behaviour of pesticides.

3.5.2 Garrett's ranking technique

Garrett's and Woodworth (1969) ranking, popularly called as Garrett's ranking technique was used to rank Brand preference for various brands of pesticides and promotional activities that influence farmer's pesticide buying decisions. The order of merit given by the respondents was converted into ranks by using the following formula.

Per cent position= $100*(R_{ij}-0.50)/N_j$

where,

R_{ij} = Rank given for i^{th} item by j^{th} individual

N_j = Number of items ranked by j^{th} respondent

With the help of Garrett's table, the per cent position is estimated and converted into scores, then for each factor the per cent position values are evaluated and mean values of score is calculated. The factors having highest mean value is considered to be the most important factor and ranked accordingly.

3.4.3 Factor analysis

Factor analysis is a statistical method used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors. Factor analysis searches for such joint variations in response to

unobserved latent variables. The observed variables are modeled as linear combinations of the potential factors, plus "error" terms. The information gained about the interdependencies between observed variables can be used later to reduce the set of variables in a dataset.

3.4.4. Uses of Factor Analysis

1. To identify underlying factors that explains the correlation among a set of variables. A set of statements can be used to measure the profiles of consumers. These statements may then be factor analyzed to identify the underlying factors.

2. To identify a new, smaller set of uncorrelated variables to replace the original set of correlated variables in subsequent multivariate analysis.

3.4.5. 2 Terminology in Factor Analysis

i) Factor: A factor is an underlying construct or dimension that represents a set of observed variables. In the credit card company for example, the demographic characteristics, socio economic status and background status represent a set of variables.

ii) Factor Loading: Factor loading help in interpreting and labeling the factors. It measures how closely the variables in the factor are associated. It is also called factor-variable correlation. Factor loadings are correlation coefficients between the variables and the factors.

iii) Eigen Values: Eigen values measure the variance in all the variables corresponding to the factor. Eigen values are calculated by adding the squares of factor loading of all the variables in the factor. It aids in explaining the importance of the factor with respect to variables. Generally, factors with Eigen values more than 1.0 are considered stable. The factors that have low eigen values (<1.0) may not explain the variance in the variables related to that factor.

iv) Communalities: Communalities, denoted by h2, measure the percentage of variance in each variable explained by the factors extracted. It ranges from 0 to 1. A high communality value indicates that the maximum amount of the variance in the variable is explained by the factors extracted from the factor analysis.

v) **Total Variance explained:** The total variance explained is the percentage of total variance of the variables explained. This is calculated by adding all the communality values of each variable and dividing it by the number of variables.

vi) **Factor Variance explained:** The factor variance explained is the percentage of total variance of the variables explained by the factors. This is calculated by adding the squared factor loadings of all the variables and dividing it by the number of variables.

3.4.6 Factor Analysis Model

$$X_i = A_{i1}F_1 + A_{i2}F_2 + A_{i3}F_3 + \ldots\ldots\ldots\ldots\ldots\ldots + A_{im}F_m + V_iU_i$$

where,

X_i = i^{th}standardized variable

A_{ij}= standardized multiple regression co-efficient of variable on common factor

F = common factor

V_i = standardized regression co-efficient of variable i on unique factor

U_i= Unique factor for variable i

m = number of common factors

The unique factors are uncorrelated with each other and with the common factors. The common factors themselves can be a linear combination of the observed variables.

$$F_i = W_{i1}X_1 + W_{i2}X_2 + W_{i3}X_3 + \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots + W_{ik}X_k$$

where,

F_i = estimate of i^{th} factor

W_i = weight or factor score co-efficient

K = number of variables

It is possible to select weights or factor score co-efficient so that the first factor explains the largest portion of the total variance. Then a second set of weights can be selected so that the second factor accounts for most of the residual variance subject to being uncorrelated with the first factor. The same principle can be applied can be selecting additional weights for the additional factors.

IV RESULTS AND DISCUSSION

Keeping the objectives in view, the results of the study are presented under the following headings.

4.1 Socio-economic characteristics of the pomegranate growers.

4.2 Pesticides brand preference of pomegranate growers.

4.3 Factors influencing farmer's purchase decision pesticide brands.

4.4 Market share of different brands of pesticides in the Tumakuru district.

4.1 Socio-economic characteristics of the pomegranate growers

Socio-economic profile of the respondents play a major role in decision making, risk assumption and profitable production decisions of farming. The results in respect of Socio-economic profile of the sample farmers are presented in Table 4.1.

4.1.1 Age of the pomegranate growers

The distribution of the respondent farmers according to the age is presented in Table 4.1. The age- wise classification of respondent farmers showed that 33.33 per cent of farmers belonged to the age group of 41-50 years followed by 27.77 per cent of farmers 31-40 years and the remaining 22.22 per cent of farmers were under the age group up to 30 years and the rest 16.68 per cent of farmers belonged to the age group of more than 50 years.

The age of the household head is an important factor in agriculture because it determines the experience one has in different farming situations/ conditions. Hence, it is clear that the middle age (33.33%) respondents are actively engaged in farming in the study area (Table 4.1).

4.1.2 Education level of the pomegranate growers

The distribution of the respondents by educational level is presented in the Table 4.1. In the cumulative sample of 90 respondent farmers, 33.33 per cent of them had education up to middle school followed by 22.22 per cent had studied up to the Primary school and 20 per cent had studied up to high school, 13.35 per cent of them had education up to PUC followed by 7.77 per cent who has studied up to graduation level. Nearly 3.33 per cent of the respondents had no schooling.

Education plays a key role in enhancing the individual knowledge of the farmers and their perception about particular brand of the company. In the cumulative sample of 90 respondent farmers (Table 4.1) 33.33 per cent of them had education up to middle school, followed by 22.22 per cent had studied up to the Primary school and 20 per cent had studied up to high school, indicating that most of them had knowledge of pesticide brands and its usage on the crops for maximizing the productivity of the crop.

4.1.3 Family size of the pomegranate growers

The family size of the respondent farmers in Tumakuru district is presented in the Table 4.1. The highest number (66.67 %) of respondents were under the category of less than four members, followed by the family size of five to eight members (27.78 %) and more than eight members (5.55 %). The average family size of the sample farmers was found to be 4 members in the study area.

Size of the family play an important role in agriculture particularly in respect of cultivation of fruits and pulses. Further, due to labor shortage in agriculture the family members have to contribute their physical labour either directly or indirectly in agriculture. The highest numbers of respondents under the category of four members in a family which indicated that less family members concentration in agriculture. The next category of respondents had five to eight members which indicates even less participation among the respondent members (Table 4.1).

The casual discussion among the family respondents revealed that cultivation of fruits and pulses is very attractive in present day's family due to remunerative prices in the market require less labor which enhances their agricultural income. Hence, the respondents with large families are cultivating fruits and pulses to increase income from agriculture.

4.1.4 Area under pomegranate

From the Table 4.1 shows that, 45.56 per cent of pomegranate growers cultivated more than 5 acre followed by (33.11 %) of more than 2 to 5 acre and (23.33 %) of less than 2 acre.

The study revealed that pomegranate was important commercial crop for farmers and majority (45.56 %) of farmers cultivated pomegranate more than 5 acre in their

Plate 1: Data collection with Pomegranate growing farmers

total land and followed by (33.11 %) of them cultivated more than 2 to 5 acres of land(Table 4.1).

4.1.5 Classification of pomegranate growers based on size of land holding

The distribution of the respondent farmers according to land holding is furnished in the Table 4.1. Among sample farmers 50 per cent were under the category of big farmers followed by small farmers at 33.33 per cent and marginal farmers at 16.67 per cent.

Table 4.1: Socio-economic characteristics of pomegranate growers

(n=90)

SI. No.	Characteristics	Frequency	Percentage to the total
1.	**Age (years)**		
a)	Up to 30	20	22.22
b)	> 31-40	25	27.77
c)	> 41-50	30	33.33
d)	More than 50	15	16.68
Total		**90**	**100.00**
2.	**Education level (years)**		
a)	illiterate	03	3.33
b)	Primary school	20	22.22
c)	Middle school	30	33.33
d)	High school	18	20.00
e)	PUC	12	13.35
f)	Graduation	7	7.77
Total		**90**	**100**
3.	**Family size**		
a)	Small (Up to 4 members)	60	66.67
b)	Medium (5-8 members)	25	27.78
c)	Big (>8 members)	5	5.55
Total		90	100
4.	**Area under pomegranate**		
a)	<2 ac	21	23.33
b)	>2 ac to 5 ac	28	31.11
c)	>5 ac	41	45.56
Total		**90**	**100**
5.	**Size of land holdings**		
a)	Marginal farmers (<2.5 ac)	15	16.67
b)	Small farmers (2.5-5 ac)	30	33.33
c)	Big farmers (>5 ac)	45	50.00
Total		**90**	**100**

The land holding of respondents depends on the family type. Majority of rural people were having nuclear family type. So majority of farmers having land holding more than 5 acres and belongs to big farmers category.

4.1.6 Number of crops grown per year by the pomegranate growers

From the Table 4.2 indicates that number of crops grown per year by the sample farmers. It can be observed from the table that 83.33 per cent of the farmers cultivated one to two crops during the year. Nearly, 16.67 per cent of them cultivated three to four crops during the year.

The number of crops grown per year is little high since the farmers grow mainly pulses with short duration because farmers from this region mainly dependent on rainfed agriculture. Hence, they grow crops depending upon rain fall intensity (Table 4.2). Therefore, The crops grown per year by farmer respondents is little high.

Table 4.2: Number of crops grown per year by the pomegranate growers

(n=90)

Sl. No.	Number of crops grown per year	Number	Percentage to the total
1.	1-2 crops	75	83.33
2.	3-4 crops	15	16.67
Total		**60**	**100**

4.1.7 Number of pesticide sprays per crop by the respondents

Table 4.3 provides the information on number of pesticide sprays given per crop per season by the sample farmers. It can be seen from the table that on an average 22 times farmers sprayed pesticides on the pomegranate cultivation per season followed by 4 times spray of pesticides on red gram crop, 2 times spray for areca nut. Hence, it is clear from the table that use of pesticides on crops is little high, since they have no other alternatives to save their crops from pest attack.

An average numbers of pesticide sprays given per crop per season by the sample farmers ranges from 8 to 22 times because pomegranate crop more prone to pests and diseases . The farmer who cultivate pulses applied, on an average 2 sprays per season to control most prevalent sucking pests and thrips (Table 4.3).

Table 4.3: Number of pesticide sprays per crop by the respondents

(n=90)

Sl. No.	Crop	Average number of sprays per season	Average number of sprays
1.	Pomegranate	20 – 27 sprays	22
2.	Red gram	3-4 sprays	4
3.	Areca nut	1-2sprays	2

4.1.7 Classification of input retailers based on age group

Keeping the objectives in mind the primary data was collected from retail traders also in the study area. The sample respondents of retailers were classified according to the age group and the details are presented in the Table 4.4. The average age of the sample retail traders was found to be 37 years. The age wise classification of sample retailers showed that 43.33 percent of retailers belonged to the age group of 41-50 years followed by age groups of 31-40 years (26.65%).The remaining traders are in the range of 30 years (16.65%), followed by more than 50 years (13.33%).

It is clear from this table that retail business traders, middle aged group probably take up the business due to risk in the business and also penetration in to the market takes long time. Hence, the retail traders who have communication ability to persuade farmers to buy their pesticides brands, entrepreneurship skills and ready to take risk can only continue to survive in this competitive business.

4.1.8 Literacy level of the input retailers

Education plays a key role in enhancing the individual knowledge of the traders in the study area. The distribution of the respondent retailers by education level has been presented in the Table 4.4. In the cumulative sample of 30 respondents, 53.33 per

cent of them had education up to graduation level followed by PUC (26.67%) and the remaining respondents (20%) studied up to high school level.

Table 4.4 clearly indicates that the retail traders who literates are attracted to this business due to attractive margins in the agri-input business Hence. knowledge, awareness entrepreneurship qualities exhibited by the retail traders are mainly due to their educational background.

Table 4.4: Personal characteristics of input retailers

SI. No.	Characteristics	Frequency	Percentage to the total
1.	**Age(years)**		
a)	Up 30	5	16.65
b)	31-40	8	26.65
c)	41-50	13	43.33
d)	More than 50	4	13.33
Total		**30**	**100**
2.	**Education level(years)**		
a)	High school	06	20
b)	PUC	08	26.67
c)	Graduation	16	53.33
Total		**30**	**100.00**

4.1.9 Classification of agri-input retailing based on nature of ownership

The information regarding nature of ownership of sample respondents is presented in the Table 4.5. Sole-proprietorship type of retailing in agri-inputs was 83.34 per cent and remaining 16.66 per cent of the retailing was under partnership form of business organization.

In any business, there are various kinds of risks involved, If an individual undertakes business as a sole proprietor, profit or loss is his own. But if there are two or three people involved in any business i.e. a partnership business sharing of profit or loss in the business and may leads to differences of opinion among the partners which may

Plate 2: Data collection with pesticide dealers

result in legal disputes and in the end may ruin all the partners involved in the business. Hence, it is clear from the table that nearly 83.34 per cent of the traders are doing retail business individually and only 16.66 per cent of the retail traders have entered the business in partnership mode (Table 4.5).

Table 4.5: Classification of agri-input retailing based on nature of ownership

(n=30)

Sl. No.	Nature of ownership	Numbers	Percentage to the total
1.	Partnership	5	16.66
2.	Sole-proprietorship	25	83.34
	Total	**30**	**100**

4.1.10: Prevalence of diseases in pomegranate crop

The information on the type of disease or pest on Pomegranate crop and extent of occurrence was elicited from farmers. The results are presented in the Table 4.6. It may be observed from the table that Bacterial blight and Wilt were most common as all the farmers reported to have observed these diseases. About 100 per cent of farmers reported Bacterial blight followed by Wilt (92.22%) and Alternaria black spot (66.67%). About 53.33 per cent of respondents reported heart rot occurrence in pomegranate crop in the study area.

The information on the type of disease and pests on pomegranate crop and extent of occurrence reveals that Bacterial blight and Wilt are most common in all the farmers. respondents, followed by Alternaria black spot and Fruit rot disease (Table 4.6). Prevalence of Heart rot disease in pomegranate was reported to low by farmers. Thus, incidence of pest and diseases varied between orchards as influenced by management and varietal response.

Table 4.6: Prevalence of diseases in pomegranate crop

(n=90)

Sl. No.	Diseases of pomegranate crop	Number of farmers reporting this as major disease*	Percentage to the total
1.	Bacterial blight	90	100
2.	Wilt	83	92.22
3.	Alternaria black spot	60	66.67
4.	Fruit rot	55	61.11
5.	Heart rot	48	53.33

Note: * Multiple responses were given by the respondent

4.2 Pesticide brand preference of pomegranate growers

4.2.1 Brand awareness of pesticides among pomegranate growers

The popularity of pesticide brands was studied by eliciting farmers' preference for pesticide brands. Tumakuru being one of the popular pomegranate producing districts of the state, farmers are familiar with different brands of pesticides. It can be observed from the Table 4.7 that all the farmer respondents preferred Confider as most preferred with 95.55 per cent followed by Blitox (91.11 %), Coragen (88.89 %) Streptocyclin (86.65 %) brands for control of Pomegranate diseases. Similarly, Tagpon-39 (81.11%) brand was moderately preferred but in case of Sritaf and Bordeaux brands were least preferred by the sample farmers in study area.

Brand awareness of respondents on pesticides revealed that majority of respondents prefer confider followed by blitex, coragen and Streptocyclin because quick control of diseases by these pesticides and easy availability of these pesticides.

Table 4.7: Brand awareness of pesticide among pomegranate growers

(n=90)

Sl. No.	Brands	Number of farmers	Percentage to the total
1.	Confider	86	95.55
2.	Blitox	82	91.11
3.	Coragen	80	88.89
4.	Streptocyclin	78	86.65
5.	Diathin M-45	75	83.33
6.	Tagpon-39	73	81.11
7.	Score	70	77.77
8.	Acrisio	67	74.44
9.	Dhanapreet	64	71.11
10.	Trishol	62	68.89
11.	Anarika	60	66.66
12.	Marshal	57	63.33
13.	Sritaf	54	60
14.	Bordeaux	49	54.44

Note: * Multiple responses were given by the respondent

4.2.2 Pesticide brands preferred by pomegranate growers

The popularity of pesticide brands was studied by eliciting farmer's preference for pesticide brands. Tumakuru being one of the popular pomegranate producing districts of the state, farmers are familiar with different brands of pesticides. It can be observed from Table 4.8 that all the farmer respondents preferred Confider it was the most preferred brand (88.89%) followed by M-45 (85.56%), Streptocyclin (81.11%), Tagpon-39 (77.78%), Blitox (75.78%), Score (72.22%), Coragen (68.89%), etc. use to control pest in pomegranate orchards.

Farmer purchase particular brand of pesticide according to their requirement. And performance although wide range of pesticides are available in the market farmers choose a particular brand, their choice influenced by a number of factors. The popularity of pesticide brands is studied by eliciting farmers preference for pesticide brands. It can be observed from the results that majority of the respondent farmers

preferred Confider, Diathin M-45, Streptocyclin, Tagpon-39, Blitex, Score, Coragen brands for control of pomegranate diseases.

Table 4.8: Pesticide brands preferred by pomegranate growers

n=90

Sl. No.	Brands	Number of farmers	Percentage to the total
1.	Confider	80	88.89
2.	Diathin M-45	77	85.56
3.	Streptocyclin	73	81.11
4.	Tagpon-39	70	77.78
5.	Blitox	68	75.56
6.	Score	65	72.22
7.	Coragen	62	68.89
8.	Acrisio	59	65.55
9.	Dhanapreet	55	61.11
10.	Trishol	53	58.89
11.	Anarika	50	55.55
12.	Marshal	46	51.11
13.	Sritaf	41	45.55
14.	Bordeaux	37	41.11

Note: * Multiple responses were given by the respondent

4.3. Factors influencing farmer's pesticide purchase decision

4.3.1 Factors influencing the pomegranate growers on purchase decision of pesticide brands

The important attributes influencing the factors influencing farmer's pesticide purchase decision. were analysed using factor analysis. In factor analysis, the first step is to check the adequacy of factor analysis with the help of Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test (Table 4.9).

In this study, the KMO measure was 0.648 which revealed that the factors extracted will account for moderate amount of variance. The chi-square value for Bartlett's test was significant and therefore, rejecting the null hypothesis of

independence among variables.

Eigen values greater than one are considered for determining the number of factors and with the help of Cattell's scree plot, the factors are determined. The screen plot is an alternative method of identifying the number of factors to extract via factor analysis as it displays the sharpest drop in the Eigen values of the factors, which highlighted that the factors would not explain a significant amount of the variance of scale items.

It was noticed from the analysis that five factors had Eigen values greater than one and as such only five values were retained. Altogether 15 attributes were identified such as long term protection, brand popularity, effectiveness or good results, recommendation by dealers, credit availability, timely availability, low price, previous experience, new product in the market, advertisement by company, low pesticide residue, eco-friendly, and availability in small quantity pack sizes. These attributes were clubbed into five major factors. Long term protection, Brand popularity and effectiveness or good results was the major factor influencing the consumer purchase decision followed by recommendation by dealers, credit availability, timely availability, previous experience, new product in the market, advertisement by company, low pesticide residue, safety and promotional attribute" "availability attribute" "longevity and quantity attribute."

An analysis of the factors influencing purchase decision of pesticides brands revealed that "brand and protection attribute" was most important factor which influence the purchase decisions. of farmers who are loyal to the pesticide brands and they prefer pesticides which give long term protection to crop. "Credit and influence of dealers" was second important attribute influencing pesticide purchase decision of farmers. Credit facility for pesticides plays an important role in purchase decision; farmers prefer to purchase pesticides more on credit rather than cash and farmers depend on trader's suggestions in the purchase of pesticides. Third influencing factor was 'Availability' attribute which clearly indicates that timely availability of pesticides during curial production stages of pomegranate was a driving factor in the purchase of pesticides. "safety and promotional attribute was another important influencing factor which indicates farmers are concerned about safety properties of pesticides and promotional activities under taken by pesticide trades and/or companies had influence on pesticide purchase decision.

Table 4.9: KMO and Bartlett's test for variance among factors influencing the pomegranate growers on purchase decision of pesticide brands

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.648
Bartlett's Test of Sphericity	Approx. Chi-Square	631.43
	Degree of freedom	136
	Significance level	0.00

Table 4.10: Factors influencing the pomegranate growers on purchase decision of pesticide brands

Sl. No.	Attributes	Factor				
		1	2	3	4	5
1.	Long term protection of the crops	0.85	0.222	0.044	0.217	0.01
2.	Brand popularity	0.82	0.179	0.132	0.131	0.02
3.	Effectiveness /Good results	0.77	0.027	0.284	0.216	0.13
4.	Recommendation by dealers	0.73	0.458	-0.031	-0.27	0
5.	Credit availability	0.66	0.22	0.097	0.498	0.24
6.	Timely availability	0.24	0.847	0.013	0.083	0.16
7.	Low price	0.38	0.615	0.435	-0.02	0.02
8.	Previous experience	0.2	0.534	0.361	0.511	-0.2
9.	New product in the market	0.19	0.531	0.198	0.504	0.2
10.	Advertisement by company	0.08	-0.084	0.778	0.047	0.32
11.	Possibility of mixing with other chemicals	0.02	0.149	0.683	0.311	0
12.	Safe chemicals	0.25	0.506	0.635	0.153	0
13.	Low pesticide residue	0.45	0.392	0.607	-0.04	0
14.	Eco-friendly	0.36	0.011	0.085	0.773	0.06
15.	Availability in small quantity pack sizes	-0.15	0.026	0.365	0.553	0.48

4.3.2 Influencers of pesticides purchase decision by respondents

Pesticides purchase behavior is studied by considering the factor influencing pesticide choice and purchase decisions. The result of the analysis is presented in the Table 4.11 based on Garrett ranking techniques analysis among the various factors /attributes retailer advice (rank I) was the major attributes influenced the farmer preferences for pesticide buying decision in Tumkuru district with Garrett score of 74.50 followed by dealers advices, fellow farmer, company representative, own experience, advertisement, RSK *etc.*

The factors influencing farmers brand preference (Table 4.11) were retailers, dealers, fellow farmers, company representative's recommendation and own experience, advertisement about brand, suggestions of RSK, Agriculture Colleges, KVK and horticulture office were the major factors influencing of farmer respondents for selecting the particular company brands of pesticides.

Table 4.11: Influencers of pesticides purchase decision by respondents

(n=90)

Sl. No.	Attributes	Mean Score	Rank
1.	Retailer	74.50	I
2.	Dealer	59.00	II
3.	Fellow farmer	53.60	III
4.	Company representative	52.40	IV
5.	Own experience	50.60	V
6.	Advertisement	49.60	VI
7.	RSK	37.90	VII
8.	Agriculture college	35.30	VIII
9.	KVK	33.70	IX
10.	Horticulture office	20.00	X

Note: * Multiple responses were given by the respondent

4.4. Market share of different brands of pesticides in the study area

4.4.1 Market share of different brand of pesticides

Market size denotes the number of buyers and sellers in a particular market. In the present study, an attempt was made to estimate the market size of pesticides in Tumakuru district.

Agrochemicals play a major role in enhancing productivity and crop protection during post-harvest period. the pesticides are the largest sub-segment of agrochemicals with 60 of per cent market share, and herbicides with 16 per cent of market share are the fastest growing agro-chemicals.

Pesticides market consists of large number of players with different kinds of brands which cater to the different needs of farmers by providing pesticides in various forms and quantities but only few brands dominated pesticide market. An attempt was made to discuss the market size of pesticide companies in Tumakuru district.

4.4.2 Market share of different pesticides brands in Tumakuru District

Tumakuru district is one of the pomegranate producing district in Karnataka. Market share of different brands of pesticide company are shown in the Table 4.12. About 40 pesticide companies operates in the study area. The total sale of pesticides during 2016-17 was Rs.222.29 lakh per retailer. In previse year market share of Bayer Crop Science company account for highest share of 17.92 per cent of the total pesticides sales followed by Indofil, Hindustan Antibiotics, Tropical agrosystem, Rallis India Ltd., Syngenta India Ltd. DuPont India Ltd. with 15.72 per cent, 13.84 per cent, 10.94 per cent, 9.84 per cent, 8.14 per cent and 6.80 per cent respectively. There are three companies which accounted for nearly 50 per cent of market share (Bayer 17.92 %, Indofil 15.72 % and Hindustan Antibiotics 13.84 %) It was found that there is stiff competition among pesticide companies in Tumakuru district.

The market share of different pesticide producing companies in the study area is presented in the Table 4.16. Confider (Bayer Crop Science) accounted for 17.92 per cent of the total pesticide sales followed by M-45 (Indofil Industries Ltd.), Streptocyclin (Hindustan Antibiotics Ltd.), Tagpon-39 (Tropical Agrosystem Pvt.

Ltd.), Blitox (Rallis India Ltd.), Score (Syngenta India Ltd.), Coragen (DuPont India Ltd.), Acrisio (BASF India Ltd.) and Sritaf (Crystal Crop Protection Pvt.Ltd.) with 15.72 per cent, 13.84 per cent, 10.94 per cent, 9.84 per cent, 8.14 per cent and 6.80 per cent, 4.40 per cent and 3.08 per cent respectively. There were five companies with less than 10 per cent market share. Thus, it could be observed that there is stiff competition among the top pesticide companies in the study area.

Table 4.12: Market share of different brands of pesticides in Tumakuru District

(n=30)

Sl. No.	**Brand**	**Companies**	**Average sales/ Dealers /year (Rs. Lakhs)**	**Percentage share**
1.	Confider	Bayer Crop Science	39.85	17.92
2.	Diathim M-45	Indofil Industries Limited	34.93	15.72
3.	Streptocyclin	Hindustan Antibiotics Limited	30.77	13.84
4.	Tagpon-39	Tropical Agrosystem Pvt. Ltd.	24.32	10.94
5.	Blitox	Rallis India Ltd.	21.88	9.84
6.	Score	Syngenta India Ltd.	18.09	8.14
7.	Coragen	DuPont India Ltd.	15.12	6.80
8.	Acrisio	BASF India Ltd.	9.77	4.40
9.	Sritaf	Crystal Crop Protection Pvt.Ltd.	6.84	3.08
10.	Others	Others	20.72	9.32
Total			**222.29**	**100**

V SUMMARY AND POLICY IMPLICATIONS

The Pomegranate (*Punica granatum*) is an important fruit crop grown in tropical and subtropical regions of India and is commonly known as Dalim, Anar and Matulum. Pomegranate comes under the family Punicaceae and is a best table fruit of the tropical and sub-tropical regions of the world. The pomegranate is very much liked fruit specially as a refreshing juice and also for its medicinal properties Fruits are mainly used for desert purpose. Several processed products are also prepared like juice, concentrates, syrups and jelly. The pomegranate seed contains oil which has a potential for industrial use. Tannin occurs in all parts of the tree, which is successfully used alone or mixed with synthetic tannins for tanning leather. India is the world's largest producer of pomegranates, followed by Iran. In India, pomegranate occupies an area of 208.73 thousand hectares with the production of 2442.39 thousand million tons and productivity 11.70 million tons per hectare. Maharashtra was ranked first in the production of pomegranate followed by Karnataka, Andhra Pradesh, Gujarat, Rajasthan and Tamil Nadu. Bhagwa, Ganesha, Arakta, Mridula and Ruby are the different species with an annual production of around 4.0 to 4.5 lakh tons in the country. Karnataka stands 5^{th} rank in area and production of fruits. In Karnataka, pomegranate occupies an area of 28.09 thousand hectare along the production of 328.92 thousand million tons and productivity 11.71 million tons per hectare. The predominant pomegranate growing districts are Chitradurga, Tumakuru, Koppal, Bagalkot, Vijayapur, Raichur, Belgaum, Bellary and Dharwad. In Tumkur district, Pomegranate is being produce on commercial extent. The area covered by pomegranate in the district is 3328.10 ha with the production of 35.40 thousand tons with the productivity of 10.64 tons per hectare.

Pesticides are chemical substances prevent to restraint pests. In general, a pesticide is a chemical or a biological agent such as a virus, bacterium, antimicrobial, or disinfectant that deters, incapacitates and kills pests. Pesticides also known as Agrochemicals. "Dawai" as the farmers call it, had a very limited brand preference and their awareness was very limited in terms of brands and companies. Regional agrochemicals companies like GSP Crop Science, Chemet Chemicals and Excel Crop Care dominated the Surat belt, while leading companies like Bayer Crop, Rallis India and Syngenta were conspicuously absent. Among Pan-India players, it could see

products of PI Industries and United Phosphorus Ltd (UPL) being sold in most of the depots. Another noticeable observation was that agrochemicals sales are done mostly on credit and a farmer pays back at the end of season from the sale proceeds of his crop produce.

The job of marketer is to meet and satisfy target customers ‟ needs and wants but “knowing customer" is not a simple task. Understanding the purchasing attributes of the target market for its company products is the essential task for the marketing dept. The job of the marketers is to “think customer” and to guide the company into developing offers, which are meaningful and attractive to target customers and creating solutions that deliver satisfaction to the customers, profits to customer and benefits to the stakeholders. Marketers must study the customer taste, preferences, wants, shopping and buying behaviour because such a study provides the clues for developing the new products, price, product range, messages and other marketing mix elements. Consumer is the king and hence it is the consumer who determines what a business is, therefore a sound marketing program is to be started with a careful analysis of the habits, attitudes, motives and needs of consumers.

Indian crop protection industry is capital intensive and highly regulated industry. The industry has been mainly composed of technical grade manufacturers and formulators. The technical grade producers usually sell premium quality chemicals in the bulk to the formulators, who then prepare formulations by mixing the carriers, solvents, surface active agents and other relevant compounds.

5.1 Special features of the study

India is the fourth massive producer and tenth largest consumer of pesticides in the world. Inspite of being one of the largest producer and consumer, the crop losses in India due to pest attack has resulted in huge losses (90,000 crores per annum). Brand preference plays an important role in purchase behavior of farmer-consumer. Pesticide purchase decision is influenced by various factors viz. effectiveness/ consideration preferences, low price, long term protection of the crops, brand popularity, credit availability etc have an impact on pesticide market and it is important in deciding market share for different brands of pesticides in agrochemical market. With this

background it is contemplated to study the Pesticide Brand Preference of Pomegranate Growers' in Tumkuru District of Karnataka.

5.2 Specific objectives of the study

i. To study the pesticides brand preference of pomegranate grower's.

ii. To evaluate the factors influencing the pomegranate grower's purchase decision of pesticide brands.

iii. To study the market share of different brands of pesticides in Tumkuru district.

5.3 Hypotheses

a. Pomegranate farmers are not brand loyal to pesticide

b. Price of the pesticide is the major factor influencing pesticide purchase choice

c. Pesticide market is highly concentrated

5.4 Methodology

Tumkuru district was purposively selected for the study to examine farmers' preference for pesticide brands, since pomegranate is gradually becoming a popular fruit crop with the farmers of Tumkuru district because of frequent droughts and consequently the failure of seasonal crops. Tumkuru district stands medium in production and productivity in the state and also the area is known for intensive usage of pesticide for cultivation of fruits. Another important factor to consider Tumkuru district for study in that the district is highly potential for the pesticides business. From the district, two taluks, viz., Pavagada and Sira were selected

The data was obtained from ninty (90) farmers – fourty five (45) farmers from each taluka. Further, thirty (30) pesticide dealers – fifteen (15) dealers from each taluka were selected. For the study, interview schedule was developed and primary data from farmers and retailers was collected. Further, relevant information was collected from various journals and websites.

The descriptive analysis is used to explain the brand preference, brand awareness, market share, purchase pattern, sales pattern and factors influencing

purchase behavior of pesticides. Garrett's ranking technique was used to rank Brand preference for various brands of pesticides and promotional activities that influence farmer's pesticide buying decisions. Factor analysis is a analytical technique used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors.

5.5 Major findings of the study

1. Nearly one-third (33.33%) of the farmers belonged to the age group of 41-50 years.
2. In the cumulative sample of 90 farmer respondents, 33.33 per cent had education up to middle school in the study area.
3. The family size of majority (66.67 %) of respondents is less than four members.
4. 45.56 per cent pomegranate growers are more than 5 acre area under pomegranate cultivation
5. Majority (50 %) of the pomegranate growers belonged to big farmers category.
6. Majority (83.33%) of the farmers cultivate one to two crops during the year in planted area.
7. On an average pomegranate growers sprayed pesticides 22 times on the pomegranate crop per season.
8. 43.33 percent of input retailers belonged to the age group between 41 to 50 years.
9. Majority (53.33 %) of input retailers had education up to graduation level.
10. Majority (83.34%) of the retailers had Sole-proprietorship bussiness.
11. Bacterial blight and Wilt are the most common diseases identified by pomegranate growers.
12. Confider, M-45 and Streptocyclin are the most preferred pesticide brands among the pomegranate growers.

13. The awareness of pomegranate growers was high in respective brands like Confider, Blitox and Coragen.

14. The pomegranate growers who are purchasing pesticide consider brand, influence of retailers , safety and longevity as the important factors in choosing a pesticide brands.

15. Retailer advices (Rank I) was major factor influenced the farmer preferences for pesticide brands.

16. The market share of Bayer Crop Science company has highest share 17.92 per cent among the pesticides.

5.6 Implications

1. Tumkuru district is one the of intensive pesticide consuming area due to extensive cultivation of pomegranate. Hence, potential opportunities exist for pesticide companies to increase their market share by promoting their brands aggressively among the pomegranate growers.

2. The pomegranate growers are spending huge amount of money to purchase pesticide to control Bacterial blight and Wilt diseases. Inspite of it the pomegranate grower are not able to get rid of these diseases. Hence the pesticide companies need to measure a sincere attempt to find permanent solution to pomegranate grower problems.

3. At present only top six brands have dominated pesticides trade in the study region. Therefore the small participant with insignificant market share necessity to focus on brand establishment to expand their market share.

4. The pesticide companies need to adopt aggressive brand building strategies and target for positive word of mouth spread by the present users of the brand.

5. The pesticide retailers' advice was one of the major factors influencing the pesticide brand preference. Among the farmers the pesticides manufacturing companies need to integrate the efforts of retailers in brand promotion to increase farmers brand loyalty.

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APPENDICES

Appendix I

State wise Area, Production and Productivity of Pomegranate in India (2016-17)

States	Area (In ' 000 Hectare)	Production (In ' 000 MT)	Productivity (In MT/Hectare)
Andhra Pradesh	7.71	105.20	13.64
Arunachal Pradesh	-	-	1.20
Chhattisgarh	0.48	4.33	9.06
Gujarat	18.54	278.10	15.00
Himachal Pradesh	2.48	2.55	1.03
Jammu and Kashmir	0.00	0.01	3.00
Jharkhand	0.01	0.04	3.55
Karnataka	28.09	328.92	11.71
Kerala	0.01	0.07	6.73
Madhya Pradesh	9.23	88.86	9.63
Maharashtra	136.75	1578.04	11.54
Mizoram	-	-	-
Nagaland	0.09	0.56	5.91
Odisha	0.24	0.90	3.75
Rajasthan	2.50	10.00	4.00
Tamil Nadu	0.51	13.96	27.43
Telangana	2.08	30.84	14.83
Others	0.01	0.01	1.00
India	**208.73**	**2442.39**	**11.70**

Source : Ministry of Agriculture & Farmers Welfare, Govt. of India. (ON1601)

Appendix II
District wise Area, Production and Productivity of Pomegranate in Karnataka (2016-17)

Sl. No.	District	Area (Hectares)	Production (Thousand Kgs)	Productivity (Thousand Kgs/hectare)
1	Bangalore Urban	22	187	8.50
2	Bangalore Rural	45	378	8.39
3	Chikkaballapura	447	5,396	12.08
4	Chitradurga	10,871	1,45,925	13.42
5	Davanagere	425	5,224	44.65
6	Kolar	66	689	10.41
7	Ramanagara	73	925	12.67
8	Mandya	107	1,060	9.91
9	Tumakuru	3,328	35,401	10.64
10	Bagalakote	1,302	14,148	10.87
11	Belagavi	628	6,480	10.32
12	Vijayapura	2,602	26,060	10.00
13	Gadag	120	753	6.28
14	Haveri	69	555	8.04
15	Hassan	681	1803	2.65
16	Bellari	3,227	36,077	11.18
17	Bidar	246	2,119	8.61
18	Kalburgi	178	1,880	10.56
19	Koppal	1,540	20,743	13.47
20	Raichur	397	4,764	12.00
21	Yadagiri	120	2,400	20.00
22	Chamarajanagara	172	1,974	11.48
23	Chikkamagaluru	551	4297	7.80

Source: Horticulture crop statistics of Karnataka state at a glance, Directorate of Horticulture, Bangalore.

Appendix III

Taluk wise Area, Production and Productivity of Pomegranate in Tumkur District (2016-17)

Sl. No.	Taluk	Area (in hectares)	Production (Thousand Kgs)	Productivity ((Thousand Kgs)/ hectare)
1	Chikkanayakanahalli	362	4,344	12.00
2	Gubbi	22	264	12.00
3	Koratagere	29	261	9.00
4	Kunigal	4	34	8.60
5	Madhugiri	165	1,815	11.00
6	Pavagada	569	6,828	10.00
7	Sira	2,124	21,240	10.00
8	Tiptur	21	294	14.00
9	Tumkur	12	109	9.10
10	Turuvekere	20	211	10.50

Source: Horticulture crop statistics of Karnataka state at a glance, Directorate of Horticulture, Bangalore.