

**TECHNOLOGICAL GAP IN BLACK PEPPER CULTIVATION  
PRACTICES**

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*Thesis submitted to the*

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**CERTIFICATE**

This is to certify that the thesis entitled 'TECHNOLOGICAL GAP IN BLACK PEPPER CULTIVATION PRACTICES' submitted in partial fulfillment of the requirements for the award of the degree of **MASTER OF SCIENCE (AGRICULTURE)** in **AGRICULTURAL EXTENSION** to the College of Agriculture, Shivamogga, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga is a bonafide record of research work carried out by **RAKSHITHA, H. K., ID No. MA1TAI0324** (rakshithakhsn@gmail.com) during the period of study in this university under my guidance and supervision and no part of this thesis has previously formed the basis for the award of any other degree, diploma, associateship, fellowship or any other similar titles.

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January, 2022**



  
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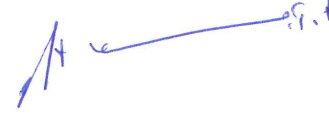
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*January, 2022*

  
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# TECHNOLOGICAL GAP IN BLACK PEPPER CULTIVATION PRACTICES

(Rakshitha, H. K.)

## ABSTRACT

A study was conducted in Chikkamagaluru district of Karnataka during 2020-21 with a sample of 90 black pepper growers. The data was collected by personal interview method using structured schedule to assess the socio-economic profile, knowledge level, technological gap and problems of pepper growers. Most of the respondents (44.44 %) had medium level of knowledge about recommended cultivation practices of black pepper. Majority of the respondents had high level of knowledge regarding general awareness on black pepper cultivation practices (78.89 %), nursery management (71.11 %) and nutrient management (80.00 %). More than half of the respondents had high level of knowledge regarding land preparation and planting (56.67 %) and medium level of knowledge on marketing (53.33 %). More than half of the respondents (57.77 %) had medium overall technological gap. Higher technological gap of 54.44 per cent was found in adopting drip irrigation and 23.33 per cent gap in case of sprinkler irrigation method. Greater technological gap of 88.89 per cent was found in bio fertilizer application. Significantly higher per cent of technological gap was found in following recommended pest and disease control measures, use of manual rubbing and gunny bags with polythene lining for storage. More than half of the respondents belong to middle age group, medium extension contact and medium management orientation. Majority of the respondents had medium level of annual income category, innovativeness, management orientation, high school education, medium farming experience, semi-medium size land holding category, and high economic orientation. The major constraints faced by the respondents are non-availability of pest and disease resistant varieties, lower price of the product, increased labour wages and high cost of inputs. Suggestions expressed by the respondents are development and supply of disease resistant varieties in time and providing timely advisory services.

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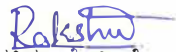
ಕರಿ ಮೆಣಸು ಕೃಷಿ ಅಳವಡಿಕೆಗಳಲ್ಲಿ ತಾಂತ್ರಿಕ ಅಂತರ

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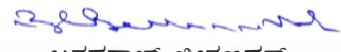
ಸಾರಾಂಶ

ಕರ್ನಾಟಕ ರಾಜ್ಯದ ಚಿಕ್ಕಮಂಗಳೂರು ಜಿಲ್ಲೆಯಲ್ಲಿ ೨೦೨೦-೨೧ ನೇ ಸಾಲಿನಲ್ಲಿ ೯೦ ಕರಿಮೆಣಸು ಬೆಳೆಗಾರರ ಮಾದರಿಯೊಂದಿಗೆ ಈ ಅಧ್ಯಯನವನ್ನು ನಡೆಸಲಾಯಿತು. ಕಾಳುಮೆಣಸು ಬೆಳೆಗಾರರ ಸಾಮಾಜಿಕ-ಆರ್ಥಿಕ ಸ್ಥಿತಿಗತಿ, ಜ್ಞಾನದ ಮಟ್ಟ, ತಾಂತ್ರಿಕ ಅಂತರ ಮತ್ತು ಸಮಸ್ಯೆಗಳನ್ನು ನಿರ್ಣಯಿಸಲು ರಚನಾತ್ಮಕ ಕಾರ್ಯಯೋಜನೆಯನ್ನು ರೂಪಿಸಿಕೊಂಡು ವೈಯಕ್ತಿಕ ಸಂದರ್ಶನ ವಿಧಾನದ ಮೂಲಕ ಮಾಹಿತಿಯನ್ನು ಸಂಗ್ರಹಿಸಲಾಗಿರುತ್ತದೆ. ಕರಿಮೆಣಸು ಬೆಳೆಗಾರರಲ್ಲಿ ಅರ್ಧಕ್ಕಿಂತ ಕಡಿಮೆ ಜನರು (ಶೇ. ೪೪.೪೪) ಕರಿಮೆಣಸಿನ ಶೀಘ್ರತ ಕೃಷಿ ಪದ್ಧತಿಗಳ ಬಗ್ಗೆ ಮಧ್ಯಮ ಮಟ್ಟದ ಜ್ಞಾನವನ್ನು ಹೊಂದಿರುತ್ತಾರೆ. ಪ್ರತಿಕ್ರಿಯಿಸಿದವರಲ್ಲಿ ಹೆಚ್ಚಿನವರು ಕರಿಮೆಣಸು ಕೃಷಿ ಪದ್ಧತಿ (ಶೇ. ೭೮.೮೯), ನರ್ಸರಿ ನಿರ್ವಹಣೆ (ಶೇ. ೭೧.೧೧) ಮತ್ತು ಪೋಷಕಾಂಶಗಳ ನಿರ್ವಹಣೆ (ಶೇ. ೮೦.೦೦) ಕುರಿತು ಸಾಮಾನ್ಯ ಅರಿವಿನ ಬಗ್ಗೆ ಉನ್ನತ ಮಟ್ಟದ ಜ್ಞಾನವನ್ನು ಹೊಂದಿರುತ್ತಾರೆ. ಪ್ರತಿಕ್ರಿಯಿಸಿದವರಲ್ಲಿ ಅರ್ಧಕ್ಕಿಂತ ಹೆಚ್ಚು ಜನರು (ಶೇ. ೫೬.೬೬) ಭೂಮಿ ಸಿದ್ಧತೆ ಮತ್ತು ನೆಡುವಿಕೆ ಬಗ್ಗೆ ಉನ್ನತ ಮಟ್ಟದ ಜ್ಞಾನವನ್ನು ಹೊಂದಿದ್ದಾರೆ ಹಾಗೂ ಮಾರುಕಟ್ಟೆಯ ಬಗ್ಗೆ ಮಧ್ಯಮ ಮಟ್ಟದ ಜ್ಞಾನವನ್ನು ಹೊಂದಿದ್ದಾರೆ (ಶೇ. ೫೩.೩೩) ಪ್ರತಿಕ್ರಿಯಿಸಿದವರಲ್ಲಿ ಅರ್ಧಕ್ಕಿಂತ ಹೆಚ್ಚು ಜನರು (ಶೇ. ೫೭.೭೭) ಮಧ್ಯಮ ಒಟ್ಟಾರೆ ತಾಂತ್ರಿಕ ಅಂತರವನ್ನು ಹೊಂದಿದ್ದಾರೆ. ಹನಿ ನೀರಾವರಿ ಅಳವಡಿಸಿಕೊಳ್ಳುವಲ್ಲಿ ಶೇ. ೮೮.೮೬ ರಷ್ಟು ಮತ್ತು ತುಂತುರು ನೀರಾವರಿ ವಿಧಾನದಲ್ಲಿ ಶೇ. ೨೩.೩೩ ರಷ್ಟು ಹೆಚ್ಚಿನ ತಾಂತ್ರಿಕ ಅಂತರ ಕಂಡುಬಂದಿರುತ್ತದೆ. ಜೈವಿಕ ಗೊಬ್ಬರದ ಬಳಕೆಯಲ್ಲಿ ಶೇ. ೮೮.೮೬ ರಷ್ಟು ಹೆಚ್ಚಿನ ತಾಂತ್ರಿಕ ಅಂತರ ಕಂಡುಬಂದಿದೆ. ಶಿಫಾರಸು ಮಾಡಲಾದ ಕೀಟ ಮತ್ತು ರೋಗ ನಿಯಂತ್ರಣ ಕ್ರಮಗಳು ಮತ್ತು ಶೇಖರಣೆಗಾಗಿ ಪಾಲಿಥಿನ್ ಲೈನಿಂಗ್ ನೊಂದಿಗೆ ಗೋಣಿ ಚೀಲಗಳ ಬಳಕೆಯಲ್ಲಿ ತಾಂತ್ರಿಕ ಅಂತರದ ಶೇಕಡವಾರು ಗಮನಾರ್ಹವಾಗಿ ಹೆಚ್ಚಾಗಿರುವುದು ಕಂಡುಬಂದಿದೆ. ಪ್ರತಿಕ್ರಿಯಿಸಿದವರಲ್ಲಿ ಅರ್ಧಕ್ಕಿಂತ ಹೆಚ್ಚು ಜನರು ಮಧ್ಯಮ ವಯಸ್ಸಿನವರು, ಮಧ್ಯಮ ವಿಸ್ತರಣೆ ಸಂಪರ್ಕ ಮತ್ತು ಮಧ್ಯಮ ನಿರ್ವಹಣೆಯ ತಿಳುವಳಿಕೆ ಹೊಂದಿದವರಾಗಿದ್ದಾರೆ. ಪ್ರತಿಕ್ರಿಯಿಸಿದವರಲ್ಲಿ ಹೆಚ್ಚಿನವರು ಮಧ್ಯಮ ಮಟ್ಟದ ವಾರ್ಷಿಕ ಆದಾಯದ ವರ್ಗದವರು, ನಾವೀನ್ಯತೆ ವಿವರಣಾ ತಿಳುವಳಿಕೆ ಹೊಂದಿದವರು, ಪ್ರೌಢ ಶಿಕ್ಷಣ, ಮಧ್ಯಮ ಕೃಷಿ ಅನುಭವ, ಅರೆ-ಮಧ್ಯಮ ಗಾತ್ರದ ಭೂ ಹಿಡುವಳಿ ವಿಭಾಗ, ಮತ್ತು ಹೆಚ್ಚಿನ ಹಣಕಾಸಿನ ತಿಳುವಳಿಕೆ ಹೊಂದಿದ್ದರು ಎಂಬುದು ಕಂಡು ಬಂದಿರುತ್ತದೆ. ಕೀಟ ಮತ್ತು ರೋಗ ನಿರೋಧಕ ತಳಿಗಳ ಲಭ್ಯತೆ ಇಲ್ಲದಿರುವುದು, ಉತ್ಪನ್ನಗಳಿಗೆ ಕಡಿಮೆ ಬೆಲೆ, ಹೆಚ್ಚಿದ ಕಾರ್ಮಿಕರ ಕೂಲಿ ವೆಚ್ಚ ಮತ್ತು ಕೃಷಿ ಪರಿಕರಣಗಳ ಹೆಚ್ಚಿನ ಬೆಲೆ, ಸಂದರ್ಶನಾರ್ಥಿಗಳು ಎದುರಿಸುತ್ತಿರುವ ಪ್ರಮುಖ ಸಮಸ್ಯೆಗಳಾಗಿವೆ ರೋಗ ನಿರೋಧಕ ತಳಿಗಳ ಅಭಿವೃದ್ಧಿ ಮತ್ತು ಪೂರೈಕೆ ಮತ್ತು ಸಕಾಲಿಕ ಸಲಹಾ ಸೇವೆಗಳನ್ನು ಒದಗಿಸುವುದಕ್ಕೆ ಸಂದರ್ಶನಾರ್ಥಿಗಳು (ರೈತರು) ವ್ಯಕ್ತಪಡಿಸಿದ ಪ್ರಮುಖ ಸಲಹೆಗಳಾಗಿವೆ.

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# ***INTRODUCTION***

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## I INTRODUCTION

India is the centre for origin of many spices which are widely used all over the world due to which it is also called as 'Land of Spices'. Black pepper (*Piper nigrum* L.), christened as the 'King of Spices', as it is the most important spice of India and world due to its day-to-day use. It is valued for its characteristic pungency and flavour as an ingredient in food preparations and also as a condiment. It is one of the important agricultural commodities of commerce and trade in India since pre-historic period. Spices are defined as "a strongly flavoured or aromatic substance of vegetable origin, obtained from tropical plants, commonly used as a condiment". Commonly grown spices in India are cardamom, ginger, turmeric, chilli, coriander, cumin, fennel, fenugreek, celery, clove, nutmeg & mace, cinnamon & cassia, saffron, aniseed, vanilla, garlic, ajowan, dill seed, kokum, mustard, tejjat and cambodge. In Karnataka spices such as black pepper, cardamom (small), chilli, ginger, turmeric, tamarind, cloves and nutmeg are being cultivated largely.

Black pepper (*Piper nigrum* L.) is a perennial climbing vine grown for its berries and is extensively used as spice. Black pepper is also very important in traditional medicine (Ravindran and Johny, 2000). The crop is the major source of income and employment for rural households in predominantly pepper growing states. In India Kerala, Karnataka and Tamil Nadu are the traditional pepper cultivation areas.

Black Pepper is the dried mature berry of *Piper nigrum* L. (Family: Piperaceae), a climbing, perennial shrub mostly found in hot, moist region of Southern India. Under cultivation, pepper vines are trailed over support as columns, 5 to 6 m tall and 1 to 2 m diameter. The climbing woody stems have the root system confined to 75 to 100 cm radius and depth. The inflorescence is a pendent spike, 3 cm to 15 cm long with 50 to 150 flowers. Flowers are minute, white pale yellow, arranged spirally on fleshy pedantries. The spice is naturally self-pollinated and pollen dispersal is aided by the presence of water droplets. The clinging roots at each node, which helps in anchoring the vine to the support trees (standards). It has straight upward growing main stem and have lateral shoots from the axils of the leaves having shorter inter nodes without adventitious roots. In such branches the terminal buds get modified into an inflorescence (spike) and the auxiliary buds continue further growth, seeded drupe often called berry. It is spherical in shape, green in colour, changing to red on ripping.

### History

Indian spices have been a heart to Indian culture and its fame is much older than Indian history. Adding more to it, spices have played an important role in the country's civilization and commerce as it was accepted worldwide due to its aroma

and its medical benefits. In ancient times, spices and herbs were used to make holy oils and unguents, which was a prominent usage of spices and herbs. Since ancient Egypt, Greek, and Roman times, India has been recognised as the legendary country of spices, and the West coast of India has maintained particularly active commercial relations with the Western world.

Indian spices were mentioned in the ancient Hindu scriptures called the Vedas, ancient Egyptian papyruses and the old testament. Although it was not until the Roman conquests that western countries discovered their culinary possibilities, spices have always been believed to have healing and magical qualities. They have been used to cast spells, as incense in religious rites, to embalm corpses, to add aroma to perfumes and as aphrodisiacs. The word spice comes from Latin species, meaning a commodity of value and distinction.

During their long and fascinating history, spices have often been more valuable than gold or precious stones and its trade has marked an exponential history of our country. Their aroma and flavours add extravagant taste to delight to the plate and have enormous combination of a lot of flavours like sweet, hot, sharp, sour, spicy, mild and fragrant. In order to add that extra flavours it is best to obtain spices in whole seed form and to grind them just prior to use.

Black pepper was one of the earliest commodities to be traded in the world. It is impossible to talk about black pepper without talking about the historical turn of events around trade, the spice routes that were established as a result of the trade and the beginning of what we call globalization today.

The early Roman Empire got direct access to the Malabar Coast in India and its range of exotic spices after their conquest of Egypt in 30 BC. To give an idea of how precious black pepper was considered - 3,000 pounds of black pepper was demanded along with gold, silver and silken tunics, as a ransom to free Rome besieged by the Huns. In 410 AD, Roman geographer Strabo documented that a fleet of 120 ships was sent on a round trip by the early empire on a one-year trip to China, South-East Asia and India. On their return, they travelled up the Red Sea, and cargo was carried via land to Alexandria (Egypt) and then shipped to Rome. These routes would later become the dominant routes for pepper trade from the Malabar Coast to Europe for more than 1,500 years.

The spice routes were the earliest trade routes and people braved treacherous sea voyages in search of precious tradable goods such as spices. Black pepper, termed black gold, was used as currency in the middle ages and the term "as dear as pepper" was used for anything very expensive. Portugal and Spain had intense rivalry between them, for control of the trade with the East.

Many of these spices had medicinal values and would grow only in the tropics of the East that made them much sought after in the West. These spices were not just used as food-flavouring agents, but in potions, antidotes for poisons, ointments and some were even burnt as incense.

The Portuguese dominated the spice trade for nearly a century only to be broken by the Dutch, and around the beginning of 1635 by the British who established pepper plantations.

No one would have thought that the humble pepper that sits as a part of the salt-and-pepper shaker on present-day dining tables would have had such an influence over the trade history in the world.

Before the 7<sup>th</sup> century, pepper vines that would grow in the wild were transplanted in Java and Sumatra. Presently, Kerala, Karnataka and Tamil Nadu are the top three pepper-producing states in India. While production has more than doubled between 2008 and 2012 in Karnataka, it has fallen to less than half during the same period in Kerala, with farmers moving towards multi-cropping and faster crops such as cardamom.

Among the 1,000-odd different species in the genus *Piper*, the other popular ones are long pepper (pippali) and betel leaf. Black pepper grows on flowering vines up to 10m in height, that grow with the support of tall trees such as silver oak or supporting poles. The vines spread easily, wherever the shoots hit the ground, the vines bear fruit from the fourth or fifth year and continue for seven years thereafter. Once the fruits at the base of the spikes start turning red, the spikes are harvested, allowed to dry and then the pepper fruits stripped off the spikes to get black pepper. The premium Indian varieties of black pepper are Malabar Garbled and Tellicherry Extra Bold. Long pepper was more popular than black pepper in the ancient times as the former grew in the north-western parts of India, making it easier to access compared with black pepper that grew exclusively down south.

### **Origin and distribution**

Pepper is considered originated in the hills of South Western Ghats of India. It is now grown in Indonesia, Malaysia, Sri Lanka, Thailand, China, Vietnam, Cambodia, Brazil, Mexico, and Guatemala apart from the country of origin. Pepper requires hot and humid climate and grows between 13° 18' 54.929" N 75° 46' 31.446" E latitudes, from sea level to up to 1500 meters above MSL. The crop tolerates temperatures between 10 °C and 40 °C. A well-distributed annual rainfall of 1250 to 2000 mm is considered ideal for pepper.

## Uses

Black pepper has occupied a unique position in the hearts of Indian people with its unique flavour. Pepper is largely used by meat packers and in canning, pickling, baking, considering for its preservative value. It has the ability to correct the seasoning of dishes, therefore used as a final dash at the end of cooking to effectively adjust the flavour. It is an important component of culinary seasoning of universal use and is an essential ingredient of numerous commercial foodstuffs. It is also used as an ingredient in spice mixes. White pepper is used in products like mayonnaise where, a black speck of pepper is not liked. Other products in use are pepper oil, oleoresin, micro encapsulated pepper, green pepper in brine, dehydrated green pepper, frozen pepper etc. Black pepper is an essential ingredient in Indian system of medicine. Piperine, the pungent principle in pepper oleoresin helps to enhance bio-availability and therefore used in pharmaceuticals. The major functional properties of pepper are analgesic, anti-pyretic, anti-oxidant and anti-microbial.

## Indian name of spices

Hindi - Kali mirch; Bengali - Kala morich, golmorich; Gujarati - Kalamari, kalomirich; Kannada - Karemenasu; Kashmiri - Marutis; Malayalam - Kurumulaku, nallamulaku; Marathi - Mira, kali mirch; Oriya - Golmaricha; Punjabi - Kali mirch; Sanskrit - Marichushna, hapusha; Tamil - Milagu; Telugu - Miriyalatige; Urdu - Kali mirch, Siahmirch.

There are more than 75 cultivars of pepper are being cultivated in India. Karimunda is the most popular of all the established cultivars. Varieties like Bilimalligesara, Karimalligesara, Doddiga, Mottakare and Uddagare are popular in Karnataka. Panniyur-1 Panniyur-2 Panniyur-5, Panniyur-6 and Panniyur-7 are pepper hybrids evolved at Pepper Research Station, Panniyur and Kerala. Pepper is cultivated to a large extent in Kerala and Karnataka and to a limited extent in Tamil Nadu and other states. Where, pepper is grown as a profitable mixed crop in almost all the coffee plantations, coconut and areca nut gardens.

India is one of the major spices producing and exporting country. India stands second in the area and production of Black Pepper after Vietnam. In India, Kerala, Karnataka and Tamil Nadu are the traditional pepper cultivating areas. Vietnam is the world leader in the production of black pepper, producing 163,000 tons which is about 34 per cent of the world's production. In India, area under pepper cultivation in 2019-20 is 1.39 lakh hectares, with the production of 5.58 lakh tones. Among the Indian states, Kerala tops first in pepper production followed by Karnataka state (ICAR-IISR, Kerala, 2020) (Table 1.1). In Karnataka Kodagu, Chikkamagaluru and Hassan districts are the leading districts in pepper production. The total production of pepper in Chikkamagaluru was 12207.6 MT in 2019-20. India exports black pepper,

white pepper and pepper oleoresins to USA, UK, Germany, Netherlands, Sweden and other European countries in large quantities (Table 1.2). In Karnataka, the major export of pepper takes place from Gonnikoppal, Sirsi and Sakaleshpura (Spices Board, Karnataka, 2020-21). The quality of pepper in Karnataka is found to be good and large in size, however low pungency level gives better taste.

### **Scope and Significance of the study**

The current research will provide some insight on the present state of knowledge and the technological gap in the adoption of improved black pepper crop growing practises. The findings of the research contribute in identifying the significant gaps in various Black pepper production practises, allowing efforts to be made to overcome these gaps. It is vital to understand the key issues faced by pepper growers so that appropriate measures can be implemented to assist the farmers. The documentation of successful farmers motivates other farmers. With this background the present investigation was designed with the following specific objectives:

1. To assess the knowledge level of black pepper growers on cultivation practices
2. To find out the technological gap in pepper cultivation practices
3. To enlist the constraints faced by pepper growers
4. To document the success stories of selected pepper growers

### **Limitations of the study**

Despite every effort to conduct a thorough inquiry into many elements of the subject, the study featured a few of the typical constraints of a single student research project. Because the researcher had to limit the study to a specific area and sample size, the findings are likely to hold true only for similar agro-climatic conditions in other locales.

The study was purely based on the responses received from the pepper growers about what they knew and felt about. Therefore, the validity of response and generalisation made out of them may be applicable in similar situations rather than wider application.

**Table 1.1: State wise area and production of Black pepper**

State	2016-17		2017-18		2018-19		2019-20		2020-21 (adv. Est)	
	Area (ha)	Prod. (tons)	Area (ha)	Prod. (tons)	Area (ha)	Prod. (tons)	Area (ha)	Prod. (tons)	Area (ha)	Prod. (tons)
<b>Karnataka</b>	37750	31000	41380	35000	148379	21000	160770	30000	160774	36000
<b>Kerala</b>	85210	20000	85140	22000	82761	17000	83770	20000	83788	22000
<b>Tamil Nadu</b>	4910	2000	5270	2000	5571	3000	6080	3000	6576	1750
<b>Total (incl. Others)</b>	134280	57000	139487	60000	244209	48000	259148	61000	259008	65000

(Source: ICAR-IISR, Kerala, 2020)

**Table 1.2: Export of Black pepper**

<b>Year</b>	<b>Quantity (t)</b>	<b>Value (Crores)</b>
2016-17	17600	1143.12
2017-18	16840	820.78
2018-19	13450	568.68
2019-20	17000	573.70
2020-21(Est.)	16300	544.45

*(Source: Spices Board, Karnataka, 2020-21)*

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***REVIEW OF LITERATURE***

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## II REVIEW OF LITERATURE

Any scientific research must begin with a thorough review of relevant literature. Apart from determining prior work and delineating the problem area, the main goal of this chapter is to provide insight into the definition of the key concept and the basis for interpreting the findings. An attempt has also been made in this chapter to collect bits of noteworthy findings from some previous empirical researches as initial references to the various phases of the current investigation.

The total material collected for the purpose has been categorised in the following headings for a methodical approach to review the previous studies.

2.1 Knowledge level of respondents on cultivation practices

2.2 Technological gap in improved/recommended cultivation practices

2.3 Personal and socio-economic characteristics of respondents

2.4 Constraints expressed by respondents

2.5 Suggestions to overcome constraints

2.6 Success stories of the respondents

### **2.1 Knowledge level of respondents on cultivation practices**

Vijaylakshmi (2013) conducted a study on technological gap in onion cultivation practices in Raichur district of Karnataka which revealed that 48.33 per cent of onion growers belonged to medium knowledge level followed by 28.33 per cent of respondents belonged to high knowledge category whereas, 23.33 per cent of the onion growers belong to low knowledge category.

Pawar *et al.* (2015) carried out a study on technological gap in pepper cultivation in Uttara Kannada district of Karnataka and showed that most of the respondents (56.67 %) had medium level of knowledge about recommended cultivation practices. Cent per cent of the respondents had knowledge about recommended varieties, sowing time, planting material runners, planting methods of mixed cropping and harvesting method. Majority of the respondents (62.22 %) had knowledge about filling material to be used in pits and 88.89 per cent respondents had knowledge regarding FYM as basal dose. Around 44.44 per cent of farmers had knowledge about major pests of the crop and majority (52.22 %) of them had knowledge about diseases.

Chandrika (2016) conducted a study on technological gap in recommended sesame production technology among farmers of Sihora district reporting that out of total sesame growers, 53.00 per cent sesame growers had medium knowledge level followed by 38.00 per cent had high knowledge level and only 9.00 per cent were found in the low knowledge level.

Navyashree (2016) carried out a study on knowledge and adoption of improved cultivation practices of pomegranate in Chithradurga district and showed that the considerable per cent of the respondents (45.00 %) had high level of knowledge about pomegranate cultivation practices whereas 31.11 and 23.89 per cent of the respondents had low and medium level of knowledge, respectively.

Ramachari (2016) worked on technological gap in cultivation of vegetable pea at Majholi district of Madhya Pradesh and showed that out of total pea growers, 47.20 per cent of growers had medium knowledge level, 29.60 per cent of growers had low knowledge level followed by 23.20 per cent of growers had high knowledge level.

Gohil *et al.* (2017) in their study on knowledge of garlic growers with respect to garlic production technology showed that majority of the garlic growers (65.00 %) had medium level of knowledge about recommended garlic production technology, followed by 20.00 per cent and 15.00 per cent with high and low level of knowledge about recommended garlic production technology, respectively.

Khandave *et al.* (2017) carried out a study on technological gap and knowledge of the cotton growers and reported that the highest percentage (82.50 %) of the respondent cotton growers were having medium level knowledge followed by 7.50 per cent and 10.00 per cent of them had low and high knowledge level respectively.

Parushni (2017) conducted a study on technology gap in ginger cultivation practices and found that the considerable per cent of the respondents (55.00 %) had medium level of knowledge about ginger cultivation practices, whereas 25 and 20 per cent of the respondents had low and high level of knowledge respectively.

Prajapati *et al.* (2017) carried out a study on knowledge level of dairy farmers regarding recommended dairy management practices concluded that 69.50 per cent of the respondents of Navsari district of south Gujarat had medium level of knowledge whereas remaining 15.00 and 15.50 per cent of them had low and high levels of knowledge, respectively.

Biswas (2019) in his study on socio demographic attributes and knowledge level of Betel vine growers on improved practices of betel vine cultivation in Nadia district of West Bengal found that the farmers have medium level of knowledge with clear conception about vine cultivation, but they do not follow scientific recommendations on use of fertilizer and pesticide application.

Nidhi *et al.* (2019) worked on knowledge level of farmers with respect to recommended groundnut production technology showed that 16.67 per cent of demonstrator and 11.67 per cent of non-demonstrator had high level of knowledge about recommended groundnut production technology. Majority of demonstrators

(65.00 %) and 58.33 per cent non-demonstrator groundnut growers had medium level of knowledge about the recommended groundnut production technology.

Kumar (2020) carried out a study on knowledge and adoption level of integrated pest management (IPM) practices among hybrid tomatoes cultivators in Kolar districts of Karnataka revealed that majority of the respondents (69.17 %) possessed medium level of knowledge while 17.50 per cent respondents had high knowledge and 13.33 per cent respondents had low level of knowledge on IPM practices of hybrid tomato.

Subhash (2020) carried out a study on knowledge and adoption of Betel vine (*Piper betel*) cultivation practices followed by the farmers of Davanagere district of Karnataka and found that majority of the respondents (76.67 %) belonged to the medium level of knowledge whereas 15.83 per cent of the respondents belonged to low level of the knowledge and 7.50 per cent of the respondents belonged to the high level of knowledge.

The generalization that could be drawn from the above studies is that there was variation in knowledge level of the respondents about recommended practices but most of the farmers were having medium level of knowledge. These studies have given a base to study the knowledge level of the black pepper growers with respect to recommended black pepper cultivation practices.

## **2.2 Technological gap in improved/recommended cultivation practices**

Chethan (2011) conducted study on knowledge and adoption of cardamom cultivation practices by the farmers of Chikkamagaluru district revealed that 48.66 per cent of the respondents belonged to medium adoption category, followed by high (29.33 %) and low (22.00 %) adoption categories.

Vijaylakshmi (2013) conducted a study on technological gap in onion cultivation practices in Raichur district of Karnataka and revealed that 41.67 per cent of onion growers fall under medium technological gap category followed by low (34.17 %) and high (24.17 %) technological gap categories.

Basanayak *et al.* (2014) in their study on technological gap in adoption of recommended practices in farmers about papaya cultivation was carried out in Gulbarga district of Karnataka revealed that 41.33 per cent of the respondents belonged to medium technological gap category followed by 32.00 per cent and 26.67 respondents belonged to high and low technological gap categories, respectively. Higher technological gap was observed regarding control of diseases.

Dipika *et al.* (2014) conducted study on technological gap in adoption of recommended turmeric production technology among turmeric growers concluded that majority (61.60 %) of the respondent turmeric growers were found in the medium

level of technological gap whereas 15.90 per cent of the respondent turmeric growers were found in high technological gap and 22.50 per cent of the respondent turmeric growers were found in low technological gap.

Patel *et al.* (2014) conducted study on technological gap in adoption of recommended maize seed production practices by the maize seed producers showed that less than two-third (65.00 %) of respondents had low technological gap, followed by medium (32.50 %), very low (02.50 %) technological gap in adoption recommended maize seed production practices, respectively. None of the respondents had high and very high technological gap in adoption recommended maize seed production practices.

Patel *et al.* (2014) conducted study on technological gap in adoption of sugarcane cultivation practices by sugarcane growers and showed that 65.00 per cent of sugarcane growers had medium technological gap, followed by low (19.00 %) and high (16.00 %) technological gap in sugarcane cultivation practices.

Sabi (2014) conducted a study on knowledge and technological gap in adoption of recommended cultivation practices in wheat found that majority of the respondents (58.33 %) belonged to medium level followed by high level (27.50 %) and low level (14.17 %) of adoption in wheat cultivation practices respectively.

Ajeet *et al.* (2015) conducted a study on gap analysis in adoption of scientific mentha cultivation in Uttar Pradesh. The study revealed that most of the respondents (65.00 %) belonged to medium level of adoption category followed by high level (18.33 %) and low (16.67 %) respectively.

Borthakur *et al.* (2015) conducted study on scaling the adoption of recommended rice production technologies by the farmers in Assam state and concluded that majority (84.16 %) of the respondents partially adopted the recommended practice of seed selection, while 10.00 per cent fully adopted and 5.83 per cent did not adopt it at all.

Kulkarni and Jahagirdar (2015) in their study on technological gap in recommended rose cultivation practices in Dharwad district, Karnataka revealed that 40 per cent of rose growers belonged to medium technological gap category followed by high technological gap (33.33 %) and low technological gap category (26.66 %).

Tigist *et al.* (2015) reported that 52 per cent of sample farmers adopted dairy technology. The experience in dairy farming, education, frequency of contact with extension agent, and perception of technology had positive and significant influence on adoption of dairy cattle technology further signifying the importance of appropriate communication strategies in technology adoption.

Ashwani and Narinder (2016) conducted study on adoption of improved black-gram practices in western Uttar Pradesh concluded that high majority of respondents *i.e.*, 50 per cent adopted to Black gram cultivation at 'low level' and 41 per cent were adopted to it at 'medium level' whereas only 9 per cent of respondents grow to 'high level'.

Bagya *et al.* (2016) reported that majority (49.68 %) of the jasmine growers had adopted local variety (Ramanathapuram), pest management practices for blossom midge and bud worm, right time of harvest, application of inorganic fertilizers, water management, weed management and application of manure after pruning. One-third (33.33 %) of the respondents had adopted the technologies like optimum spacing, application of FYM and root rot disease management.

Chandrika (2016) conducted a study on technological gap in recommended sesame production technology among farmers of Sihora district concluded that out of total sesame growers, 46.00 per cent of sesame growers had medium level of adoption, followed by 27.00 per cent had low and 27.00 per cent had high level of adoption.

Kirodee (2016) conducted study on technological gaps and constraints faced by the guava growers in Sawai, Madhopur district of Rajasthan and recorded that (70.83 %) of guava growers had medium technological gap with regards to the guava production technology followed by low (13.33 %) and high (15.83 %), respectively.

Markana (2016) conducted a study on technological gap in adoption of improved cultivation practices by kharif groundnut growers concluded that in case of overall technological gap, 62.50 per cent of farmers had medium technological gap followed by 20.83 per cent and 16.67 per cent had high and low technological gap about groundnut production technology, respectively.

Navyashree (2016) carried out a study on knowledge and adoption of improved cultivation practices of pomegranate in Chithradurga district showed that the considerable per cent of the respondents (42.22 %) had medium level of adoption of about pomegranate cultivation practices whereas 33.33 and 24.45 per cent of the respondents had high and low adoption level, respectively.

Ramachari (2016) conducted a study on technological gap in cultivation of vegetable pea at block Majholi district of M.P. showed that out of total pea growers, 51.20 per cent had medium adoption level, 31.20 per cent growers had low adoption level and 17.60 per cent growers had high adoption level.

Jatapara *et al.* (2017) conducted study on technological gap in adoption of improved cultivation practices by gram growers showed that nearly half (49.17 %) of gram growers had medium technological gap, followed by low (30.00 %), high

(15.83 %) and very low (5.00 %) technological gap in adoption of improved cultivation practices of gram crop, respectively.

Gohil *et al.* (2017) conducted study on technological gap analysis in adoption of groundnut-pigeon pea inter-relay cropping system showed that in case of overall technological gap, 65 per cent of farmers had medium technological gap followed by 18.33 per cent and 16.67 per cent had high and low technological gap about groundnut-pigeon pea cultivation technology, respectively.

Khandave *et al.* (2017) in their study on technological gap and knowledge of the cotton growers, found that majority (70.00 %) of the respondents fell in medium technological gap category whereas 25.00 per cent of the respondent cotton growers in low technological gap category and 05.00 per cent of the respondents were having high technological gap.

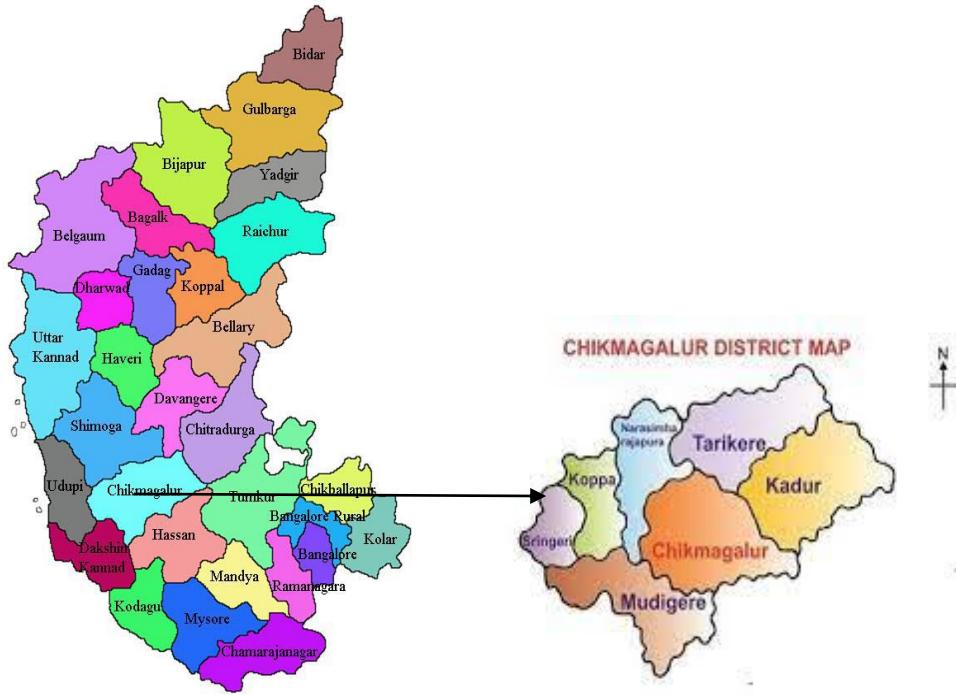
Parushni (2017) conducted a study on technology gap in ginger cultivation practices in Shivamogga district and revealed that majority of the respondents (61.67 %) belong to medium adoption category, while 24.17 per cent and 14.16 per cent of respondents belong to low and high adoption category, respectively.

Patel *et al.* (2017) conducted a study on adoption behaviour of organic farming practices by the organic farmers of North Gujarat and showed that 65.00 per cent of the organic farmers had medium level adoption followed by 22.00 per cent and 13.00 per cent of them had low and high extent of adoption, respectively.

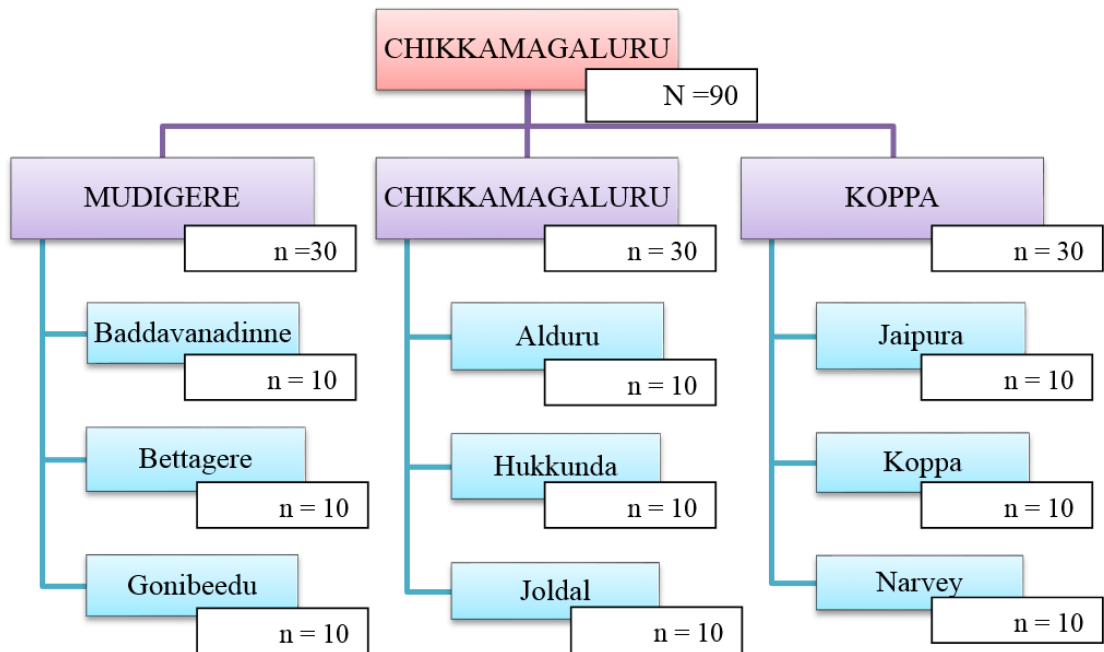
Uday *et al.* (2017) conducted research on adoption of good agricultural practices (GAPs) in basmati (scented) rice and concluded that overall technology gap was 80 per cent.

Sharma (2019) carried out a study on analysis of technological gap in adoption of recommended cultivation technologies in chickpea and the study revealed that an equally high technological gap was found in adoption of seed treatment and disease and cultural control (66.67 %) followed by irrigation requirement (57.50 %), chemical pest control (54.00 %) and application of doses of manures and fertilizers (42.50 %).

Parasar *et al.* (2020) carried out a study on factors influencing the extent of technological gap in adoption of scientific practices of tea cultivation by small tea growers of Assam and reported that majority of the respondents (71.00 %) had medium overall technological gap in adoption of scientific practices of tea cultivation followed by 17.00 per cent respondents with low overall technological gap in adoption of scientific practices of tea cultivation. A small percentage of them (12.00 %) were found with high overall technological gap in adoption of scientific practices of tea cultivation.



**Fig 1: Map showing the Study area**



**Fig. 2: Schematic representation of sampling plan for the study**

Subhash (2020) reported that majority of the respondents belonged to medium level (65.00 %) of the adoption category regarding recommended betel vine cultivation practices, whereas in practice wise adoption category the majority of the respondents are fully adopted irrigation and harvest practices and only few respondents are adopted spacing, nutrient application and plant protection practices.

Yadav *et al.* (2020) carried out a study on technological gap in different practices among chickpea growers in Satna district of Madhya Pradesh and concluded that majority of the chickpea growers were having high technological gap with respect to seed and sowing management (59.84 %) followed by fertilizer management (54.12 %) plant protection management (42.19 %) and 38.62 per cent of gram growers were having low technological gap with respect to weed management.

It can be observed from the above studies that there was variation among respondents with respect to technological gap in adoption of recommended practices. Most of the farmers belonged to medium to high technological gap category. These studies have been a support to study the technological gap among the black pepper growers with respect to recommended black pepper cultivation practices.

### **2.3 Personal and socio-economic characteristics of respondents**

#### **2.3.1 Age**

Gautam (2015) studied on measuring farmers knowledge regarding scientific dairy practices in Haryana and concluded that majority of the respondents (49.77 %) were of middle age followed by old age (40.00 %) and young age (10.23 %).

Shruti *et al.* (2015) conducted a study on assessing knowledge of tribal farmers regarding scientific animal husbandry practices reporting that majority of the tribal livestock owners (72.00 %) belonged to middle age group, while 14.66 per cent of the respondents were from old age group and 13.33 per cent hailed from the middle age group.

Kirodee (2016) conducted study on technological gaps and constraints faced by the guava growers in Sawai, Madhopur district of Rajasthan and concluded that majority of the respondents (74.16 %) were from 36 to 60 years age group, whereas 15.00 per cent respondents were above 60 years and only 10.83 per cent respondents were less than 36 years.

Navyashree (2016) conducted study on knowledge and adoption of improved cultivation practices of Pomegranate in Chithradurga district showed that majority of the respondents belonged to middle age (57.78 %) group, followed by old age (27.22 %) and young age (15.00 %) category.

Parushni (2017) reported that majority of the respondents (59.16 %) belonged to middle age group followed by 23.33 and 17.50 per cent belonged to old age and young age groups, respectively.

Saryam and Jirli (2020) conducted a study on socio economic status of orange farmers in Chhindwara district of Madhya Pradesh and reported that 42.5 per cent of the farmers belong to middle age group followed by 31.50 per cent belong to old age and 26 per cent of farmers were in young age group.

Subhash (2020) reported that majority (47.50 %) of the betel vine growers belonged to middle age group whereas 40.83 per cent respondents belonged to the young age and 11.66 per cent of the respondents belonged to the old age group.

Yadav *et al.* (2020) carried out a study on technological gap in different practices among chickpea growers in Satna district of Madhya Pradesh and reported that out of the total chickpea growers, 44.16 per cent belonged to middle age group, 31.67 per cent belonged to young age group and 24.16 per cent belonged to old age group.

### 2.3.2 Education

Navyashree (2016) conducted study on knowledge and adoption of improved cultivation practices of Pomegranate in Chithradurga district showed that, in respect of formal education level, 30.56 and 26.67 per cent of medium and low level respectively.

Ramachari (2016) conducted a study on technological gap in cultivation of vegetable pea at block Majholi district of M.P. showed that 30.40 per cent had primary education up to 20.80 per cent had up to higher secondary, 18.40 per cent had up to college education.

Jamanal (2017) conducted a study on socio-economic characteristics of soybean growers in Dharwad district of Karnataka and reported that 26.66 per cent of respondents were studied up to high school, followed by 21.33 per cent of the respondents have studied up middle school education, PUC was received by 16.00 per cent and 12.00 per cent of them studied up to primary school and least of 8.00 per cent of them have studied up to graduation.

Dharmaraj (2019) carried out a study on performance of farmer producer organizations in Shivamogga district of Karnataka and reported that majority (58.33 %) of the members belonged to medium education category, whereas, 27.51 per cent of them belonged to high education category and 14.16 per cent of them belonged to low education category.

Saryam and Jirli (2020) reported that most of the growers (29.50 %) attained high school education, followed by graduate and above (16.50 %), Intermediate

(15.50 %), middle school education (14.50 %), Primary level (14.00 %), functionally literate (7.50 %) and Illiterate 2.5 per cent.

Subhash (2020) in his study showed that 40.83 per cent of the respondents were educated up to high school followed by 25.83 per cent of the respondents were educated up to middle school, 13.33 per cent, 10.83 per cent, 9.17 per cent and 0.00 per cent were educated up to PUC, primary school, graduate, illiterate and post graduate respectively.

Yadav *et al.* (2020) in their study on technological gap in different practices among chickpea growers in Satna district of Madhya Pradesh, showed that 36.33 per cent received education up to middle level, followed by 22.50 per cent up to primary education level, 15.83 per cent to higher secondary level of education, 11.67 per cent to illiterate level and only 13.33 per cent were having college level of education.

### 2.3.3 Farming experience

Jaganathan and Nagaraja (2015) in their study on perception of farmers about arecanut based multi-species cropping system in Dakshina Kannada district found that about 12.2 per cent of farmers were having low experience in arecanut cultivation while 73.4 per cent of farmers had medium farming experience and 14.4 per cent of the respondents had high farming experience.

Pawar *et al.* (2015) conducted a study on technological gap in pepper cultivation in Uttara Kannada district revealed that 37.78 per cent of the respondents had medium farming experience while 32.22 per cent of the respondents had high farming experience and 30 per cent of respondents had low farming experience.

Dodiya (2017) conducted study on technological gap in adoption of castor seed production technology by the castor growers concluded that majority 61.67 per cent of the castor seed producers had medium level of castor cultivation experience, whereas 25.00 per cent and 13.33 per cent of them had high and low level of castor cultivation experience, respectively. It means enormous majority (86.66 %) of the castor seed producers had medium to high experience in castor cultivation.

Parushni (2017) revealed that majority (70.00 %) of the respondents had Low farming experience (less than 10 years), while (25.00 %) of the respondents had medium farming experience (10 to 20 years) and 5 per cent of respondents had high farming experience.

Subhash (2020) reported that 67.50 per cent of respondents had medium level of betel vine cultivating experience while 16.66 per cent of respondents had high experience and low 15.83 per cent of respondents had low betel vine cultivating experience. It means majority of the respondents had medium level of betel vine cultivating experience.

Bidve *et al.* (2021) carried out a study on socio-economic, communicational and psychological characteristics of pomegranate growers from western Maharashtra and observed that majority of the growers (58.61 %) had medium level of farming experience followed by 21.67 and 19.72 per cent growers had high and low level of farming experience.

#### 2.3.4 Land holding

Kumud *et al.* (2016) studied on socio-economic characteristics of home gardens in Bhimtal block of Nainital district, Uttarkhand and reported that maximum numbers of land households (48.48 %) were having marginal land followed by small landholding (30.30 %) and only 21.21 per cent of households had large land holding.

Nishitha (2016) carried out a study on decision making and participation of farm men and women in sugarcane cultivation in Mandya district and reported that 51.67 per cent of farm men belonged to small size land holding category and the other 48.33 per cent of them belonged to marginal category of land holding.

Yadav *et al.* (2016) conducted a study on training needs and relative suitability for training programmes of tomato growers in Jaipur district of Rajasthan reported that nearly one-third (33.34 %) of the tomato growers had medium land holding, 26.67 per cent had semi-medium land holding, 21.67 per cent had small land holding, 13.34 per cent had big land holding and few (5.00 %) of them had marginal land holding.

Leelavathi (2017) conducted a study on impact of vocational training programme 'friends of coconut tree and plant protection' conducted by Krishi Vigyan Kendra, Shivamogga and reported that 32.50 per cent of the respondents possessed semi medium landholding, followed by medium (24.17 %) land holding and 23.34 per cent of the respondents had small land holding.

Parushni (2017) revealed that 35.83 per cent of the respondents were small farmers, followed by 35 per cent marginal and 20 per cent medium farmers, respectively. At least five per cent of them had no lands followed by large farmers (3.33 %).

Jamanal (2017) reported that majority of the respondents 50.66 per cent were semi-medium farmers while 23.33 per cent of the respondents were medium size of land holding farmers.

Saryam and Jirli (2020) conducted a study on socio economic status of orange farmers in Chhindwara district of Madhya Pradesh and found that 32 per cent of orange farmers were having under 1 ha of land and belong to marginal land holding category, 26.5 per cent, 30 per cent and 10.5 per cent orange farmers fell into small, Semi-medium and medium classes were, respectively

Subhash (2020) in his study on knowledge and adoption of betel vine cultivation practices found that 42.50 per cent of the respondents were belonged to small farmers whereas 31.67 per cent of the respondents were belonged to marginal farmers followed by medium farmers (22.50 %) and big farmers (3.33 %).

Yadav *et al.* (2020) in their study on technological gap in different practices among chickpea growers in Satna district of Madhya Pradesh reported that higher percentage (38.66 %) of respondents had small size (1.1 to 2 ha) of land holding followed by medium land holding (36.67 %), 15 per cent of respondents had marginal land holding and only 10 per cent respondents had large land holding.

### 2.3.5 Annual Income

Pawar *et al.* (2015) conducted a study on technological gap in pepper cultivation in Uttara Kannada district revealed that 40.00 per cent of the respondents had medium level of annual income, followed by 37.78 per cent had high annual income, while 22.22 per cent of them belonged to low annual income.

Ramachari (2016) conducted a study on technological gap in cultivation of vegetable pea at block Majholi district of M.P. showed that out of total pea growers, 46.46 per cent had low annual income (₹ 50001 to 2,36,000/-) followed by 37 per cent had medium annual income (₹ 2,36,001 to 4,18,000/-).16 per cent were under high annual income (₹ 4,18,000 to 6,00,000/-).

Leelavathi (2017) reported that 43.33 per cent of the families had medium level of income followed by low level of income (37.50 %). Remaining 19.17 per cent respondents fall into high level of income category.

Parushni (2017) expressed in her study that equal number of respondents (34.16 %) belonged to medium and low income category followed by 31.60 per cent belonging to high income category.

Sreekanth *et al.* (2018) carried out a sample survey in knowledge and adoption of IPM by rice growers in Kadapa district in Andhra Pradesh. The study revealed that majority (55.33 %) of the respondents had medium level of annual income.

Saryam and Jirli (2020) reported that majority of the orange farmers were found in the medium annual income category (₹100001 to ₹ 200000) followed by 24 per cent producers in low pay classification (less than ₹ 100000) and 09 per cent of orange producers in high pay class (Above ₹ 200000).

Subhash (2020) reported that majority of the respondents belong to medium annual income category (76.67 %) whereas 13.33 per cent and 10.00 per cent fall into high and low annual income category.

Bidve *et al.* (2021) carried out a study on socio-economic, communicational and psychological characteristics of pomegranate growers from western Maharashtra

and reported that majority of the respondents belong to medium annual income category followed by high (14.17 %) and low (13.33 %) level of annual income category.

#### 2.3.6 Cropping system

Jaganathan and Nagaraja (2015) in their study on perception of farmers about arecanut based multi-species cropping system in Dakshina Kannada district reported that about 49 per cent of farmers were having three component crops *viz.*, black pepper and banana, major benefits as perceived by farmers were additional income from intercrops, more employment for family labourers and increased soil fertility.

Chandrakant (2017) conducted a study on multi storied cropping system in horticulture in Phillipines and reported that intercropping of pepper gardens with ginger, turmeric, colocasia and elephant foot yam is advantageous. Banana as an intercrop in yielding gardens reduces pepper yield. It is also intercropped with arecanut, coffee and coconut. In multiple cropping based system the maximum advantage was observed with combination of coconut + black pepper + pineapple + cocoa. The incidences of Fusarium disease in Brazil was reduced in mixed cropping system of rubber + black pepper + pineapple + clove.

Poornima (2020) carried out a study on indigenous technical knowledge in Chikkamagaluru district and observed that a greater number (46.25 %) of farmers had poor level of cropping pattern, followed by 37.50 and 16.25 per cent of them having fair and good levels of cropping pattern, respectively.

#### 2.3.7 Extension contact

Gautam (2015) studied on measuring farmers knowledge regarding scientific dairy practices in Haryana concluded that majority of the respondents (45.77 %) belong to medium level of extension contact followed by low level (36.44 %) and high level (17.77 %) of extension contact.

Karamjit (2015) studied on analysis of adoption and constraints perceived by small paddy growers in rice production technologies in Muktsar district of Punjab State and concluded that majority respondents (68.33 %) was in medium category followed by about 18 per cent of the respondents with low level of extension contact and 16 per cent of the respondents were belonged to high level of extension contact.

Ashwani and Narinder (2016) had conducted study on adoption of improved black-gram practices in western Uttar Pradesh concluded that Majority of respondents belong to 'medium group' of extension contact i.e. 50 per cent. 27 per cent respondents had 'high' contact and only 23 per cent respondents had 'low' extension contact towards improved Black Gram production technology.

Jamanal (2017) conducted a study on socio-economic characteristics of soybean growers and revealed that 45.33 per cent soybean growers had medium extension contact followed by low 34.66 per cent and high 20.00 per cent level of contact with extension agency.

Parushni (2017) in her study reported that maximum of (45.00 %) respondents belonged to medium level category, followed by 35.83 and 19.16 per cent of high and low level of extension contact categories, respectively.

Kumar (2018) conducted a study on an analysis of adoption level and economic performance of pomegranate growers in Tumkur district of Karnataka and reported that 44.44 per cent of the pomegranate growers had medium level extension contact, 28.89 per cent of the growers belonged to low level extension contact and 26.67 per cent of them had high level extension contact.

Mutteppa (2019) carried out a study on knowledge and extent of adoption of improved cultivation practices by turmeric growers in Belagavi district and revealed that 41.67 per cent of the turmeric growing farmers had high extension contact level followed by medium and low level extension contact with 35.00 per cent and 23.33 per cent, respectively.

Subhash (2020) found that majority of the respondents had medium level (68.33 %) of the extension contact while, 16.67 per cent of the respondents had low extension contact and 15.00 per cent of the respondents had high extension contact.

### 2.3.8 Information seeking behaviour

Venkateshwarulu (1992) in his study on study technological gap adoption improved technology Betel vine production Guntur district Andhra Pradesh found that 54.17 per cent of the respondents had medium information seeking behaviour while 24.16 per cent had high and 21.67 per cent had low information seeking behaviour.

Khiratkar (2009) in his study on Socio-Economic Transformation due to Pan-Pimpri Cultivation in Akola and Amravati District revealed that 62.00 per cent of the farmers had medium information seeking behaviour followed by high (20.00 %) and low (18.00 %) information seeking behaviour.

Kavitha *et al.* (2014) in their study on information seeking behaviour of dairy farmers revealed that 52.86 per cent of the farmers belonged to medium information seeking behaviour followed by high (31.43 %) and low (15.71 %) information seeking behaviour.

Hassan (2016) a study on technological gap in banana cultivation technologies in southern district of Tamil Nadu the farmers were in contact with the AAO in personnel channel. Personal localite channels like relatives (60 %), farmers from own village (51.67 %) and friends (45.8 %) were used by the farmers. The farmers

used impersonal channels like television (91.67 %), newspaper (81.67 %) and radio (64.17 %). Only 5.83% of the farmers were found to be reading farm magazines. The farmers who have attended trainings and seminars are only 35.8 percent, except for newspapers the other print media were not used by the farmers.

Sancley and Mazhar (2019) conducted a study on socio-economic characteristics of the adopters and non-adopters of inter-cropping in areca nut plantation in Ri-Bhoi district of Meghalaya most of the adopters (38.06 %) are having medium level of seeking information behaviour and majority of the non-adopters (45.16 %) are having a low level of information seeking behaviour.

Subhash (2020) reported that 63.33 per cent of the farmers belong to medium level of Information seeking behaviour while 25.00 per cent of farmers belong to high and 11.67 per cent farmers belong to low information seeking behaviour category.

### 2.3.9 Economic motivation

Naveen (2016) carried out a study on knowledge and adoption of post-harvest technologies by turmeric growers of Bagalkot district and found that majority (57.50%) of the turmeric growers had medium economic motivation followed by 2.67 per cent with high and 20.83 per cent with low economic motivation respectively.

Navyashree (2016) carried out a study on knowledge and adoption of improved cultivation practices of pomegranate in Chitradurga district of Karnataka and indicated that majority of pomegranate growers were distributed in medium (43.89 %) economic motivation category followed by high (31.67 %) economic motivation category and low (24.44 %) economic motivation category.

Puneet (2016) in his study reported that more than half (54.17 %) of KVK trained farmers had high economic motivation followed by medium (25.00 %) and low (20.83 %) category of economic motivation.

Uikey (2016) conducted a study on knowledge and technological gap in adoption of recommended cultivation practices of potato in Gwalior district of Madhya Pradesh and reported that, more than half of the respondents (55.83 %) had medium level of economic motivation while one fourth (25.00 %) of the respondents possessed low economic motivation and one fifth (19.67 %) had high level of economic motivation

Parushni (2017) showed that that 80.34 per cent of the respondents belonged to medium economic motivation category followed by 9.16 per cent and 8.33per cent belonged to high and low economic motivation category respectively.

Patel (2018) carried out a study on impact assessment of vocational training programmes conducted for rural youth by KVK Gwalior in Madhya Pradesh revealed

that majority (60.66 %) of the respondents had medium level of economic motivation followed by high (24.00 %) and low (15.34 %) level of economic motivation.

Vivek and Sahana (2020) conducted a study on socio-economic characteristics of the farmers following e-tendering system for arecanut in Karnataka and reported that two third of the farmers sampled from the Shivamogga APMC had medium (66.00 %) level of economic motivation. Whereas, less than one fifth of the farmers exhibited high (18.00 %) and 16.00 per cent had low level of economic motivation.

Bidve *et al.* (2021) carried out a study on socio-economic, communicational and psychological characteristics of pomegranate growers from western Maharashtra and showed that 63.33 per cent growers had medium level of economic motivation followed by 18.61 and 18.06 per cent growers had high and low level of economic motivation.

### 2.3.10 Innovativeness

Khatun (2016) in his study on innovativeness of betel leaf growers to use improved practices revealed that majority of the respondents had medium innovativeness (60.9 %) and a considerable number of respondents (39.10 %) had high innovativeness to use improved practices.

Supriya (2016) conducted a study on Decision making pattern and work participation of farm women in management of coffee plantation in Kodagu District and revealed that 45.56 per cent of the farm women had high level of innovativeness, whereas 33.33 per cent of them had low level and 21.11 per cent of them had medium level of innovativeness.

Jamanal (2017) in his study revealed that, 54.66 per cent of respondents belonged to medium level of innovative proneness category, while 28.00 per cent and least of 17.33 per cent of respondents belonged to low and high level of innovative proneness categories, respectively.

Leelavathi (2017) found that 41.67 per cent of the respondents belonged to medium level of innovativeness followed by high (40.83 %) and low (17.50 %) level of innovativeness.

Parushni (2017) revealed that 50.84 per cent of the Ginger growers were found in medium innovative proneness category followed by 34.16 and 15 per cent of the respondents were distributed in the low and high innovative proneness categories, respectively.

Mutteppa (2018) carried out a research to study knowledge and extent of adoption of improved cultivation practices by turmeric growers in Belagavi district and reported that majority of respondents (43.33 %) belonged to medium level of

innovativeness followed by 30.00 per cent had low level innovativeness and about 26.67 per cent of turmeric growers had high level of innovativeness.

Kumar (2018) conducted a study on an analysis of adoption level and economic performance of pomegranate growers in Tumkur district of Karnataka and showed that 34.44 per cent of the pomegranate growers had medium level of innovative proneness, 33.33 per cent growers had low level of innovative proneness and 30 per cent of them had high level of innovative proneness.

Shinde (2020) in his study on farmers' perception and adoption of groundnut production technologies in Udupi district found that 55.83 per cent of the farmers belonged to high level of innovativeness, followed by medium (25.00 %) and low (19.17 %) level of innovativeness.

Subhash (2020) reported that the majority of the respondents were belonged to medium level (60.00 %) of innovativeness whereas 21.67 per cent of the respondents belong to low innovativeness category and 18.33 per cent of the respondents belonged to the high innovativeness category.

Vivek and Sahana (2021) conducted a study on socio-economic characteristics of the farmers following e-tendering system for arecanut in Karnataka and reported that majority of the farmers in the Shivamogga APMC had medium (70.00 %) level of innovativeness and 16.00 per cent of them exhibited high (16.00 %) level of innovativeness whereas, less than fifteen per cent had low (14.00 %) level of innovativeness.

### 2.3.11 Management orientation

Lokhande (2010) reported that two-thirds of the farmers had a medium level of management orientation (66.70 %), while 18.30 and 15.00 per cent of the farmers had a medium and high level of management orientation, respectively.

Pynbianglang (2011) showed that 72.50 per cent of farmers had medium level of management orientation followed by 14.00 per cent and 13.50 per cent of farmers were having low and high level of management orientation, respectively. Thus, it may be concluded that majority of the farmers had a moderate level of management of orientation.

Kale (2012) reported that majority (46.67 %) of the farmers had medium level of management orientation, 32.50 per cent of the farmers had high level of management orientation and remaining 20.83 per cent of the farmers had low level management orientation.

Naveen Kumar (2012) reported that the majority (46.67 %) of pomegranate farmers in the Chitradurga district belonged to the medium category of management orientation, followed by 30.00 per cent of respondents having high-level management

orientation and 23.33 per cent of respondents having low-level management orientation. The result showed that comparatively more numbers (46.00 %) of respondents belonged to medium level of management orientation, followed by a high level of management orientation (28.67 %) and low-level management orientation (25.33 %).

Chauhan and Patel (2013) in their study on entrepreneurial characteristics of poultry entrepreneurs reported that majority (71.25 %) of the poultry entrepreneurs had medium to high level of management orientation.

Ingole (2014) in his study revealed that majority (66.70 %) of the respondents belonged to medium category of management orientation followed by (19.20 %) of the respondents having low management orientation and (14.20 %) of the respondents having high level management orientation.

Sunil and Kharatmol (2014) revealed in their study that 77.91 per cent of the farmers had a medium level of management orientation, while 21.25 and 0.84 per cent of them had a low and high level of management orientation, respectively.

Prashant (2015) observed that 47.50 per cent of the farmers had a medium level of management orientation, followed by low (29.17 %) and high (23.33 %) level of management orientation.

#### **2.4 Constraints expressed by the respondents**

Vijaylakshmi (2013) conducted a study on technological gap in onion cultivation practices in Raichur district of Karnataka and revealed that, non availability & higher labour charges (72.50 %) whereas 24.16 per cent of non availability of location specific and season wise advisory services, followed by long distance of market (23.34 %) and lack of goods carrier with reasonable transport charge (17.50 %) and (8.33 %) lack of technical guidance.

Maheriya *et al.* (2015) conducted a study on constraints experienced and suggestions offered by farmers in adoption of recommended paddy production technology, reported that lack of knowledge about recommended dose of fertilizers (70.83 %), high cost of fertilizers and pesticides (70.83 %), labour shortage at the time of transplanting and harvesting (75.00 %), low market price of paddy (62.50 %), poor contacts of extension workers with farmers (58.33 %) were the major constraints expressed by the farmers.

Puneet (2016) reported that the majority of KVK trained farmers expressed the constraints such as financial problem (71.67 %) followed by shortage of green fodder during summer season (59.17 %), low price for the milk (44.17 %), improper veterinary services (43.33 %), high rates of milch animals (39.17 %), high maintenance cost (38.33 %), low milk production (30.83 %), inadequate money and

lack of loan facility (30.00 %), inadequate knowledge of diseases and their control (10.83 %) and delay in milk payment (9.17 %).

Amogh (2017) conducted a study on economic impact of climate change and adaptation strategies in black pepper (*Piper nigrum* L.) cultivation in Kerala revealed that increased in high incidence of pest and disease and high labour cost, fluctuation in market prices, increase in labour cost, fluctuation in market prices and high cost of adaptation practices were major constraints faced by adopters and non-adopters respectively.

Agashe (2017) reported that maximum respondents having problems of more demand of local red variety of potato by consumer and cost of seed potato (100 %) both followed by non-availability of certified seed of potato in market and lack of facility of cold storage (94.30 %) both.

Leelavathi (2017) revealed that majority of the respondents expressed the constraints related to insurance renewal and claims (81.67 %), difficulty in using the equipment for the trees with bigger trunk size (55.83 %), difficulty in management of mite infestation (51.67 %), less yield (30.00 %), not getting coconut climbing work every day was the problem expressed by professional (21.67 %), repair and maintenance of climbing equipment (20.00 %) and less scope for women to use climbing equipment (11.67 %).

Khandave *et al.* (2017) in their study on technological gap and knowledge of the cotton growers, reported that the major constraints faced by the respondents were inadequate storage and transportation facilities (85.00 %), high cost of chemical fertilizers (72.50 %) and unavailability of seeds in time (64.16 %).

Singh *et al.* (2017) conducted a study on constraints and adoption of black gram production technology by the farmers in Mirzapur district of Uttar Pradesh and revealed that majority of the respondent (95.93 %) faced constraints by complexity, it was also followed by lack of technical guidance (93.33 %), not existing of the market (92.5 %), lack of marketing facilities (91.66 %), non-availability of skilled labours (90.83 %), monopoly of merchant in the market (51.66 %) and lack of financial support (43.33 %).

Mutteppa (2018) carried out a study on knowledge and extent of adoption of improved cultivation practices by turmeric growers in Belagavi district and reported that great majority of turmeric growers expressed constraints related to shortage and scarcity of labour during harvesting and high labour wages (96.67 %) and majority of them faced the constraints like high incidence of pest and diseases (84.17 %) like shoot borer, root borer and rhizome rot etc., non-availability biofertilizers (76.67 %) locally, high cost of inputs (69.17 %) and price fluctuations and instability (65.83 %). A considerable percent (39.17 %) of turmeric growers faced the constraint of high

commission and storage charges. Only 19.17 per cent of them faced the problems in accessing credit and a negligible per cent (7.50 %) of turmeric growers come across the water scarcity problem.

Subhash (2020) in his study on knowledge and adoption of Betel vine (*Piper betel*) cultivation practices followed by the farmers of Davanagere district of Karnataka reported that 77.50 per cent of the respondents are facing non-availability of skilled labour as the major constraint, whereas 75.00 per cent of the respondents are facing high cost of technology as the constraint, 60.00 per cent, 56.66 per cent, 52.50 per cent, 50.00 per cent, 39.16 per cent, 35.83 per cent, 29.16 per cent, and 16.67 per cent of the respondents are facing pest and disease problem, lack of technical guidance, lack of capital, traditional belief, lack of knowledge, inadequate market facilities, lack of plant material for raising of wind breaks and non availability of packing material as the constraint respectively, in relation to cultivation practices.

## **2.5 Suggestions to overcome the constraints**

Ahire and Kapse (2015) observed that, majority 91.66 per cent of the beneficiaries suggested that training programme on pomegranate cultivation should be organized. While 86.66 per cent of the beneficiaries suggested that Polythene should be provided along with farm ponds, 70.00 per cent of the beneficiaries suggested that training regarding mechanization in intercrop should be organized, 66.66 per cent of the beneficiaries suggested that seeds of Netravati variety should be available in local market. While 61.66 per cent of the beneficiaries suggested that implements required for inter cropping should be supplied within time. Whereas 58.33 per cent of the beneficiaries suggested that required implements for opening of the furrows should be available within time through custom hiring centres.

Chinmayi (2015) in her study expressed that majority of the respondents (80 %) suggested that training programmes conducted based on their needs followed by 73.33 per cent members suggested to increase the loan and subsidy amount, 56.67 per cent of members suggested that unity should be maintained, 46.67 per cent of members suggested that follow-up should be increased.

Puneet (2016) reported that the majority of KVK trained farmers expressed the suggestions such as regular and timely supply of green fodder at reasonable rate (72.50 %) followed by the loan amount for the purchase of dairy animals to be increased and government schemes need to inform (70.00 %), more educational trips to be organized by dairy co-operative society for the benefit of dairy enterprises (67.50 %), training programme has to be conducted based on the farmer's needs (55.83 %), field visits are to be organized to fodder demonstration units (48.33 %), More importance to be given to educating aspects such as feeding of milch animals, pregnant animals, care of pregnant animals and about cross breed milch animals

(45.83 %), training to be given for concentrates preparation using local resources (19.17 %).

Sharma and Badodiya (2016) observed that, more than half (55.83 %) of the respondents suggested that loan should be granted for farm activities, 46.66 per cent of them suggested that rural women felt the need of subsidy on seeds, fertilizers and pesticides etc., 44.16 per cent of them suggested that extension exposure, 43.33 per cent of them suggested that storage facilities should be available, 41.66 per cent of the suggested that training and demonstration should be conduct and provide latest information about agricultural innovation. 32.50 per cent of them suggested that supply of inputs through co-operative society at village level and government should be given emphasis for women empowerment.

Khandave *et al.* (2017) in their study on technological gap and knowledge of the cotton growers, reported that important suggestion made by majority of the respondents were supply of inorganic fertilizers at subsidized rates (75.83 %), trainings in respect of plant protection, INM, grading, packaging etc. should be organized.

Parushni (2017) reported that majority of the respondents (80.83 %) has suggested that ginger should be included in crop insurance scheme of government of India, followed by 70.00 per cent of respondent suggested that support price should be given to ginger. Whereas, 93.33 per cent of the respondents suggested that there is an urgent need of a comprehensive package for management of pests and diseases in ginger has to be developed, to provide subsidies for fertilizers and to develop pest and disease resistant varieties, in order to achieve higher yields. Also, organizing study tours to progressive farmers to ginger fields (46.66 %) to motivate them to adopt new practices and to reduce technological gap in cultivation of ginger crop.

Mutteppa (2018) conducted a research a study on knowledge and extent of adoption of improved cultivation practices by turmeric growers in Belagavi district and concluded that majority of the respondents suggested the supply of inputs at standardized and subsidized rates (85.00 %) followed by fixing of MSP to turmeric crop (80.83 %), regular and compulsory visiting to the farmers field by extension personnel (75.83 %) and establishment of local market facilities (60.83 %). Also, considerable per cent of them suggested for the establishment of government storage and procurement structures (42.50 %), timely dissemination of market information (32.50 %) and only 24.17 per cent of them suggested for giving credit to farmers at lower rate of interest.

Chavhan (2019) observed that majority (95.41 %) of the respondents suggested to provide accurate and timely weather advisory was the ranked I suggestion given by the farmers followed by improvisation of network and

connectivity (94.58 %) was another major suggestion given was ranked II by them. In other major suggestion was provide timely credit for smooth agricultural operations (92.08 %) was ranked III important suggestion followed by arrangement of proper transportation facilities (82.50 %) was ranked IV, as major suggestions.

## **2.6 Success stories of the respondents**

Shelke *et al.* (2011) reported that due to adoption of bullock drawn planter there is an average increase in yield of 11.21 per cent of different crop was observed. The planter was shared by 6 to 9 farmers on annual benefit calculated on Soya bean and Bengal gram which is the major crops was ₹ 21,044. There was saving in manpower of three women and one skilled man. The cost of sowing is reduced by 46 per cent and time has been saved by 66.00 per cent.

Gupta *et al.* (2014) carried out a study on diversification and innovation in farming system changes the livelihood of the farmers of Samba district of Jammu region (J&K) – a success story and documented about a farmer named Kumar, an innovative farmer of village Kralian, Vijaypur block of District Samba. A major producer of off-season vegetables (onion, cauliflower and turmeric), improved varieties of paddy and wheat, turmeric grower, fruit and forestry plantations, etc. After intervention of KVK, in 2013, his total income from various crops was ₹ 12.55 lakhs. He was awarded at various occasions at national and state levels.

Gupta *et al.* (2015) conducted a study on strawberry production for diversifying agricultural income: a success story from Samba district of J&K. The study highlighted the success story of Mr. Sham Singh, a commercial farmer who had successfully integrated into the main stream economy through production and marketing of strawberry along with vegetables and fruit production by adopting new technologies of production, diversification, competitive and marketing strategies in his farming operation to maximize the annual income from farming. The author reported the challenges that he is encountering and how he plans to address them and concluded that this success story will provide information that will be helpful for upcoming strawberry entrepreneurs.

Leelavathi (2017) expressed in her study that Chandrappa, a marginal farmer who was working as an agricultural labour and used to earn only ₹ 3,000 to 4,000 per month. He expressed after attending the training programme now he climbs 60 to 80 palms a day without tiredness and now he is earning ₹ 20,000 to 25,000 per month. Coconut tree climbing equipment changed the life of Mr. Chandrappa and raised new hope in his life.

Leelavathi (2017) reported that Raju son of Shiva Kumar, is a young farmer who is cultivating paddy in 1.5 acres and in the remaining half acre, he has arecanut and coconut plantation. He is maintaining dairy animals and getting an income of

₹ 50,000 per annum by selling milk. After attending the programme, his working area is extended to surrounding villages of Gama village which was earlier restricted to only native village. His monthly earnings from professional climbing has enhanced to ₹ 20,000 per month from earlier income of ₹ 4,000. The skill acquired by attending FoCT training, transformed him as a professional coconut tree climber.

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# ***METHODOLOGY***

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### III METHODOLOGY

The present study was conducted during 2020-21 in Chikkamagaluru district of Karnataka. The methodology followed in the study is presented in this chapter under the following headings.

- 3.1 Research design
- 3.2 Selection of district
- 3.3 Selection of taluks
- 3.4 Selection of villages
- 3.5 Selection of respondents
- 3.6 Brief description of the study area
- 3.7 Variables selected for the study and their operationalization
- 3.8 Success stories
- 3.9 Procedure followed in data collection
- 3.10 Statistical tools used in the study

#### **3.1 Research design**

The present study was conducted using the “*Ex-post facto design*”, as the phenomenon has already occurred and the researcher does not have control over independent variables. Hence, the particular design was considered appropriate.

#### **3.2 Selection of district**

The study was conducted in Chikkamagaluru district of Karnataka. It has 8 taluks *viz.*, Ajjampura, Chikkamagaluru, Kaduru, Koppa, Mudigere, Narasimharajapura, Shringeri and Tarikere. The district was purposively selected because of large area and production of black pepper which is second largest district in area and production of black pepper in Karnataka state. The climate and soil of Chikkamagaluru is most suitable for coffee, black pepper and other plantation crops. Also, the district has research stations and KVKs working under the university jurisdictions.

#### **3.3 Selection of Taluks**

Considering the maximum area and production under pepper as criteria, three taluks *viz.*, Chikkamagaluru, Mudigere and Koppa of Chikkamagaluru district were selected purposively for conducting the study. Accordingly, Mudigere had 16381.35 ha area with 5405.85 MT of production, while, Chikkamagaluru and Koppa had an area of 13603.701 ha and 7005.43 ha with production of 4081.11MT and 1541.19 MT, respectively (Table 3.1).

### **3.4 Selection of villages**

The villages having maximum area under pepper cultivation were listed in descending order in consultation with State department of Horticulture, Government of Karnataka. From the list, three villages having maximum area under pepper cultivation were selected from each taluk randomly.

### **3.5 Selection of respondents**

From the selected villages, 10 respondents cultivating black pepper were selected randomly. Thus, the sample size was 30 from each taluk making a total sample size of 90 respondents.

### **3.6 Brief description of the study area**

The study was conducted in Chikkamagaluru district of Karnataka State. The landscape of Chikkamagaluru district mainly consists of vast stretches of hills and also plains. The district is located in the south-western part of the Karnataka state. It consists of eight taluks- Ajjampura, Chikkamagaluru, Kaduru, Koppa, Mudigere, Narasimharajapura, Shringeri and Tarikere. The district is famous for its coffee cultivation and is called as the “Coffee land of Karnataka”.

The climate of Chikkamagaluru district is agreeable and cool throughout the year. March, April and May are regarded as summer months. Temperature varies from 13 °C to 32 °C. The lowest minimum temperature was recorded 13 °C during the month of December. The district is situated between 12° 54' 42'' and 13° 53' 53'' north latitude and between 75° 04' 46'' and 76° 21' 50'' east longitude. Its greatest length from east to west is about 138.4 kilometres and from north to south 88.5 kilometres. The district receives normal average rainfall of 1904 mm. The highest point in this district is Mullayanagiri, 1926 m. above sea level which is also the highest point in the state of Karnataka, 30.00 per cent of the district (2108.62 km<sup>2</sup>) is covered with forests. The district borders Shimoga district to the north, Davangere district to the north-east, Chitradurga and Tumkur districts to the east, Hassan district to the south, Dakshina Kannada district to the south-west and Udupi district to the west. The rivers Bhadra, Tunga, Hemavathi, Netravati, and Vedavathi flow all year round. The district is rich in iron, magnetite and granite deposits. Black soil is found around inam-Dattatreya peeta. Many parts of the district are situated in heavy rainfall zone. However, two taluks Kadur and Tarikere are located in less rainfall zone towards the east comprising more or less level lands and having features of maidan areas. The gently sloping uplands, the mounds and ridges are mostly covered by rock out crops. The drainage direction lines were towards West to East falling with very gently sloping (1-3 %) to sloping lands. The streams are active during rainy season only.

The district consists of mainly 3 types of soils, viz., red loamy soil, red sandy soil and laterite soil. Agriculture production in the district is spread over three seasons- namely kharif, rabi and summer. Important crops like cereals i.e. paddy, ragi, maize, red gram, horsegram, green gram, field beans, Bengal gram, groundnut, sesamum, sunflower, castor and plantation crops like coffee, black pepper, arecanut, coconut, cardamom and also banana are grown here.

As of the 2011 India census, Chikkamagaluru had a population of 11,037,961. Males constituted 49.79 per cent of the population and females 50.21 per cent. The average literacy rate is 79.25 per cent, higher than the national average of 59.50 per cent. (Indian Census Report, Govt. of India, 2011). The district has a population density of 158 inhabitants per square kilometer.

### **3.7 Variables selected for the study and their operationalization**

#### **Variables**

Variables were selected for the present study after extensive review of literature available on the subject, in consideration of relevant previous research works, consultation with the experts on the subject and discussion with the members of advisory committee. The list of dependent and independent variables is given in the table 3.2:

#### 3.7.1 Dependent variables

##### 3.7.1.1 Knowledge

Knowledge refers to the information possessed by an individual. It also refers to those behaviours and test situations that emphasize the remembering of some phenomenon or material by an individual either by recognition or by the recall of ideas. The knowledge level in the present study has been operationalized as the extent to which an individual possesses understanding and comprehension of various black pepper cultivation practices. Teacher made test as suggested by Anastasi (1961) was used and the knowledge test was constructed based on the package of practices and discussion with subject matter specialties, extension personnel of the university.

A list of 20 items was selected for the purpose and each was administered in a question form to the respondents to obtain the response with four options to each question, out of which 3 were wrong and only one was the correct response. The questions and answers about the knowledge test were carefully designed in consultation with members of the advisory committee.

**Table 3.1: Taluk wise area and production of Black pepper in Chikkamagaluru district**

2019-20

Sl. No.	Name of the taluk	Area (Ha)	Production (MT)
1	Ajjampura	2.47	0.79
2	Chikkamagaluru	13603.7	4081.11
3	Kaduru	37.78	10.578
4	Koppa	7005.43	1541.19
5	Mudigere	16381.35	5405.85
6	Narasimharajapura	2200.16	660.048
7	Shringeri	1188.02	475.208
8	Tarikere	102.6	32.832
	<b>Total</b>	<b>40521.51</b>	<b>12207.6</b>

(Department of Horticulture, Govt. of Karnataka)

**Table 3.2: Variables for the study**

	Variables	Measurement
<b>A</b>	<b>Dependent variables</b>	
1	Knowledge	“Teacher made test” suggested by Anastasi (1961)
2	Technological gap	Scale developed by Ray (1995)
<b>B</b>	<b>Independent variables</b>	
1	Age	Procedure followed by Trivedi (1963)
2	Education	Procedure followed by Trivedi (1963)
3	Farming experience	Schedule developed for the study
4	Experience in black pepper cultivation	Schedule developed for the study
5	Land holding	Classification by Govt. of Karnataka (1996)
6	Annual income	Schedule developed for the study
7	Cropping system	Schedule developed for the study
8	Extension contact	Procedure followed by Hardikar (1998)
9	Information seeking behavior	Scale developed by Rao (1980) with suitable modification
10	Economic motivation	Scale developed by Supe and Singh (1969) with suitable modification
11	Innovativeness	Scale developed by Moulik and Rao (1973) with suitable modification
12	Management orientation	Scale developed by Samanta (1977) with suitable modification

The answers to questions were quantified by giving one score to the correct answer and zero score to the incorrect one. As a result, the maximum score that one could get was 20 and the minimum was zero. The total knowledge score for each respondent was calculated by summing up the number of items correctly answered by an individual respondent. The knowledge level was quantified by using frequency and per cent. Based on the total score, the respondents were classified into three categories namely, low, medium, and high using mean ( $\bar{x}$ ) and half standard deviation (SD) as a measure of the check.

Category	Criteria	Score
Low	<(Mean – ½ SD)	< 14.77
Medium	(Mean ± ½ SD)	14.77 to 17.59
High	>(Mean + ½ SD)	>17.59

### 3.7.1.2 Technological gap:

Technological gap refers to the proportion of gap in adoption of recommended cultivation practices. It has been conceived as the difference between the package of practices of Black pepper cultivation practices recommended by University of Agricultural Sciences, Dharwad, and the extent of adoption of these recommended practices at farmers' level. Scale developed by Ray (1995) was used. In the present study, technological gap was operationalized on the division of 20 recommended black pepper cultivation practices by the farmers and expressed in percentage. The total deviation of adoption of recommended cultivation practices was calculated by using the following formula:

$$\text{Technological gap} = \frac{\text{Recommended score} - \text{Actual score}}{\text{Total score}} \times 100$$

$$\text{Mean technological gap} = \frac{\text{Total gap for all the practices considered}}{\text{Total score}} \times 100$$

Mean technological gap in critical farm operations of black pepper cultivation was calculated.

Based on the total score, the respondents were classified into three categories namely, low, medium and high using mean ( $\bar{x}$ ) and half standard deviation (SD) as a measure of the check.

Category	Criteria	Score
Low	<(Mean – ½ SD)	<13.60
Medium	(Mean ± ½ SD)	13.60 to 40.39
High	>(Mean + ½ SD)	>40.39

### 3.7.2 Independent variables

#### 3.7.2.1 Age

It is the basic characteristic related to a person's maturity, physical well-being and motivation it may influence adoption. It refers to the chronological age of the respondents at the time of investigation. The age of the respondents was recorded as mentioned by them in full years. The procedure developed by Trivedi (1963) was used to classify the respondents into various age groups such as young, middle and old. The results were expressed in frequency and percentages.

<b>Category</b>	<b>Criteria</b>	<b>Score</b>
Young	Up to 35 years	1
Middle	36 to 55 years	2
Old	Above 55 years	3

#### 3.7.2.2 Education

Education refers to the process of acquiring knowledge, skill, values and habits. In the present study, the variable was conceptualized as the number of years of formal education acquired by the respondent at the time of investigation. Categorization and scoring was made in accordance with the socio-economic status scale developed by Trivedi (1963).

<b>Category</b>	<b>Criteria</b>	<b>Score</b>
Illiterate	Cannot read and write	0
Primary school	I - IV Standard	1
Middle school	V - VII Standard	2
High school	VIII - X Standard	3
Pre-University/Diploma	XI - XII Standard	4
Graduation	Degree	5
Post graduation and above	Master's degree or above	6

#### 3.7.2.3 Farming experience

It is referred as the total number of years of experience put in farming. The experience of the respondents in completed years at the time of investigation was taken into account and the respondents were categorized into low, medium and high category of experience based on mean and half standard deviation as a measure of check and the results were expressed in frequency and percentage.

Category	Criteria (in years)	Score
Low	<(Mean – ½ SD)	<19.93
Medium	(Mean ± ½ SD)	19.93 to 29.88
High	>(Mean + ½ SD)	>29.88

#### 3.7.2.4 Experience in black pepper cultivation

It refers to the total number of years of experience put in black pepper cultivation practices. The respondents were categorized into low, medium, and high category of experience based on mean and half standard deviation by taking all responses.

Category	Criteria (in years)	Score
Low	< (Mean – ½ SD)	<17.91
Medium	(Mean ± ½ SD)	17.91 to 26.06
High	> (Mean + ½ SD)	> 26.06

#### 3.7.2.5 Land holding

Land holding could be operationally defined as the number of acres of land possessed by the respondent at the time of investigation. The criterion prescribed by the Karnataka Land Reforms Act 38 of 1966 (Part B), 99, 195-196 under section 2(a) 32 as one acre of irrigated or garden land was equivalent to three acres of dry land.

The criterion prescribed by Ministry of Rural Development, Government of India vide circular No.280-12/16/19 RD-III (Vol-II) dated 15<sup>th</sup> November 1991 and as followed by Maraddi (2006) and Ashok (2011) was used and the respondents were grouped into five categories. The results were expressed in frequency and percentage.

Category	Land holding (acres)
Marginal farmers	Up to 2.5
Small farmers	2.51 to 5.00
Semi-medium farmers	5.01 to 10.00
Medium farmers	10.01 to 25
Big farmers	Above 25

#### 3.7.2.6 Annual income

It was calculated by adding the income from agriculture and other subsidiary occupation. The subsidiary income was defined as one which comprised of income from all sources other than agriculture. By considering the annual income of each

respondent, they were grouped into low, medium and high categories taking mean and half standard deviation.

Category	Criteria	Income (in lakhs)
Low	<(Mean – ½ SD)	<₹ 7.98
Medium	(Mean ± ½ SD)	₹ 7.98 to ₹ 22.14
High	>(Mean + ½ SD)	>₹ 22.14

### 3.7.2.7 Cropping System

Cropping system refers to the crops, crop sequences and management of techniques used on a particular land area over a period of years. It includes all spatial and temporal aspects of managing an agricultural system. In the present study it is taken as cultivation of black pepper alone, *i.e.* mono cropping/sole cropping, inter cropping of black pepper with arecanut, black pepper with coffee, black pepper with cardamom and banana. The frequency and percentage of each cropping system was calculated.

Sl. No.	Cropping System	Score
1	Arecanut + Black pepper	1
2	Black pepper + Coffee	2
3	Arecanut + Black pepper + Coffee	3
4	Arecanut + Banana + Black pepper + other crops	4

### 3.7.2.8 Extension contact

It refers to the degree to which the respondent meets the extension personnel of various development departments, universities, KVKs, NGOs and private agencies *etc.*, to get information on aspects related to agriculture and allied activities. The procedure followed by Hardikar (1998) was used for scoring of this variable. The extension contact of respondents was classified by considering frequency and percentage. The scoring procedure is as mentioned below.

Frequency	Score
Regular	2
Occasional	1
Never	0

The respondents were classified into three categories based on mean and half standard deviation.

Category	Criteria	Score
Low	<(Mean – ½ SD)	< 2.74
Medium	(Mean ± ½ SD)	2.74 to 4.24
High	>(Mean + ½ SD)	>4.24

### 3.7.2.9 Information seeking behaviour

This variable was operationalized as the extent of exposure of respondents to sources such as informal sources, formal sources, mass media and other sources to gather any scientific or technical aspects about pepper cultivation practice. It was measured by using the scale developed by Rao (1985). Scoring for each statement was done on a three-point scale as 2, 1 and 0 for regular, occasional and never respectively. The maximum and minimum scores obtained were 30 and 0, respectively. The respondents were classified into three groups based on mean and half standard deviation as measures of check.

Scoring and categorization: Four response categories namely frequently, occasional, rarely and never were provided with weights of 2, 1 and 0, respectively. All the scores on sub items were summed up to get a total score. The respondents were classified into three categories as given below by using the class interval technique.

Category	Criteria	Score
Low	<(Mean – ½ SD)	<10.83
Medium	(Mean ± ½ SD)	10.83 to 14.08
High	>(Mean + ½ SD)	>14.08

### 3.7.2.10 Economic motivation

Economic motivation refers to the value or attitude for which the respondent attached greater importance to profit maximization. The scale developed by Supe and Singh (1969) was used. In order to assess the economic motivation of the respondents in their activities, the different activities were listed and they were asked to indicate their motivational factor as agree, undecided and disagree. The scores assigned as 2, 1 and 0, respectively. The respondents were classified into low, medium and high by using mean and half standard deviation as measures of check.

Category	Criteria	Score
Low	<(Mean – ½ SD)	<8.94
Medium	(Mean ± ½ SD)	8.95 to 10.82
High	>(Mean + ½ SD)	>10.83

### 3.7.2.11 Innovativeness

Innovativeness is considered as socio-psychological orientation of individual closely associated with change, adopting new ideas and practices. It is defined as the degree to which an individual adopts new ideas, relatively earlier than others in his social system. In the present study, it refers to the behavioural pattern of an individual who has an interest and desire to seek changes in pepper cultivation practices willing to introduce such changes into his operation when practicable and feasible and also it refers to the degree to which a farmer is eager in adopting the innovation pepper cultivation practices early in his field.

The innovativeness scale developed by Moulik and Rao (1973) was used in this study, with slight modification was administered for quantification of the degree of farmers' self-evaluation about their innovativeness. The scale consists of nine statements regarding innovativeness of the respondent while adopting new practices. The responses were documented as Agree, Undecided and Disagree. Out of nine statements on innovativeness, seven statements were positive and the score was given as 3, 2 and 1 for Agree, Undecided and Disagree respectively. There were two negative statements for which the scoring followed was 1, 2 and 3 for Agree, Undecided and Disagree respectively. Likewise for each statement, each respondent's innovativeness score was calculated. The respondents were categorized into three categories based on the mean and half standard deviation.

<b>Category</b>	<b>Criteria</b>	<b>Score</b>
Low	$<(\text{Mean} - \frac{1}{2} \text{SD})$	$<13.54$
Medium	$(\text{Mean} \pm \frac{1}{2} \text{SD})$	13.55 to 16.77
High	$>(\text{Mean} + \frac{1}{2} \text{SD})$	$>16.78$

### 3.7.2.12 Management orientation

It refers to the degree to which a farmer is oriented towards scientific farm management comprising of planning, production and marketing functions on his farm. In order to know the respondents' management orientation, the scale developed by Samanta (1977) was used. The scale consists of six statements representing planning, production and marketing aspects. The response for each statement was rated on three-point continuum scale. The positive statements were given scores of 2, 1 and 0 for Agree, undecided and disagree, respectively. The scoring was reversed in case of negative statements. Thus, the maximum and minimum scores each respondent could obtain were 12 and 0, respectively.

Based on the total score obtained by the respondents on management orientation, they were grouped into following three categories, keeping the mean and standard deviation as check.

Category	Criteria	Score
Low	<(Mean – ½ SD)	<9.48
Medium	(Mean ± ½ SD)	9.49 to 10.74
High	>(Mean + ½ SD)	>10.75

### 3.7.2.13 Constraints expressed by the respondents

To identify the problems in the pepper production, the probable problems of pepper growers in the study area were listed out in discussion with progressive farmers, scientists, and experts in the field. Responses were obtained from the pepper growers. Later on, the Garrett ranking technique was used to determine the major constraints faced by the pepper growers. Farmers were asked to rank the constraints according to its degree of importance and Garrett mean scores for each constraint was estimated with the help of its percent position.

### 3.7.2.14 Suggestions to overcome the constraints

The suggestions were given by the farmers to improve the pepper cultivations by overcoming constraints. The possible responses were collected from the farmers and notable suggestions were tabulated. The results were expressed using frequency and percentage.

## **3.8 Success stories**

It refers to in depth study of a person who rises to fortune, acclaim or brilliant achievement in a particular field. Among the 90 pepper growers, four successful farmers were interviewed and their success stories were documented and presented with the relevant photographs.

## **3.9 The procedure followed for data collection**

Keeping in view the objectives and variables of the study, a structured interview schedule was developed by consulting experts and also referring to the relevant literature at the package of practices developed by University of Horticultural Sciences, Bagalkot, IIHR, Bengaluru and KAU, Thrissur. Pre-testing of the schedule was carried out in the non-sample area for its practicability and relevancy. The final schedule was prepared by making necessary modifications, additions and deletion based on pre-testing results and as the need for data collection. The final format of the interview schedule is given in Appendix I.

The data were collected from the respondents through personal interview method in an informal atmosphere.

## **3.10 Statistical tools used**

The statistical tools or techniques used for analyzing the data were as follows:

### 3.10.1 Mean ( $\bar{X}$ )

This technique was considered for categorizing the respondents into groups based on their scores. The formula for calculating the arithmetic mean was as follows:

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

Where,

$\bar{X}$  = Mean of the observations

$\sum X$  = Sum of all the observations

N = Total number of observations

### 3.10.2 Standard deviation (SD)

The standard deviation is the square root of the mean of the square of the deviations of the set of observations from their mean. It was used as a measure to categorize the respondents into various categories.

$$SD = \sqrt{\frac{\sum (X - \bar{X})^2}{n - 1}}$$

Where,  $\bar{X}$  = Mean

n = Number of observations

### 3.10.3 Frequency and percentage

The percentage was used for simple comparisons. For calculating percentage, the frequency of a particular set was divided by the total number of observations multiplied by 100.

### 3.10.4 Chi-square

Chi-square test was employed to find out relationship between the perception of the farmers and their profile, it is calculated by using the following formula

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i} \sim \chi^2 (r - 1)(c - 1) d. f.$$

Where,  $O_i$  = Observed value

$E_i$  = Expected value

r = number of rows

c = number of columns

### 3.10.5 Garrett ranking technique

The pepper growing farmers were asked to rank the constraints according to its degree of importance such that the most important factor will be ranked first. To

find out the major constraints faced by the farmers, the outcome of the rankings was converted into percent position by using the following formula:

$$\text{Per cent position} = \frac{100 (R_{ij} - 0.5)}{N_j}$$

Where,

$R_{ij}$  = Rank given for the  $i^{\text{th}}$  variable by  $j^{\text{th}}$  respondents

$N_j$  = Number of variables ranked by  $j^{\text{th}}$  respondents

The percent position estimated was converted into scores with the help of Garrett's table. The scores of each individual rank corresponding to that particular constraint were added and the mean value of score was calculated by dividing it with the total number of respondents. The mean score for each constraint was ranked by arranging them in descending order. The constraint having highest mean value has to be considered as the most important constraint.

#### 3.10.6 Software:

The following software was used for data analysis:

##### 3.10.6.1 Microsoft Excel

Microsoft Excel spread sheet was used for preparing master sheet, calculations and to prepare tables and figures.

##### 3.10.6.2 Statistical Package for Social Sciences (SPSS)

SPSS is a software package used statistical analysis in social sciences.



**Plate 1. Researcher during data collection at Chikkamagaluru**



**Plate 2. Researcher during data collection at Chikkamagaluru**

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# ***RESULTS***

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## IV RESULTS

The present research primarily focused on assessing the technological gap in black pepper cultivation practices. The results of the research were presented in relation to specific objectives of the study on the basis of data analysis using appropriate statistical tools and techniques. The research findings are listed under the following sub-headings:

- 4.1 Knowledge level of the black pepper growers
- 4.2 Technological gap among black pepper growers
- 4.3 Adoption level of recommended practices among black pepper growers
- 4.4 Personal and socio-economic characteristics of respondents
- 4.5 Association of dependent variables with independent variables of the respondents
- 4.6 Constraints expressed by the respondents
- 4.7 Suggestions to overcome the constraints
- 4.8 Documentation of success stories of the selected black pepper growers

### **4.1 Knowledge level of the black pepper growers**

#### **4.1.1 Overall knowledge level of the respondents about black pepper cultivation practices**

A cursory perusal of the data in Table 4.1 indicated the overall knowledge level of the respondents about recommended cultivation practices.

About half of the respondents (44.44 %) had medium level of knowledge about recommended cultivation practices of black pepper followed by high (37.78 %) and low (17.78 %) level of knowledge.

#### **4.1.2 Knowledge level of the respondents about individual recommended cultivation practices**

The results of the Table 4.2 depicted the knowledge level of respondents on black pepper cultivation practices.

Majority (78.89 %) of the respondents had high knowledge regarding general awareness on black pepper cultivation practices. Whereas, 16.67 per cent of respondents had medium knowledge and only 4.44 per cent of them had low knowledge in general awareness on black pepper cultivation practices.

**Table 4.1 Overall knowledge level of the respondents on black pepper cultivation practices**

(n=90)

<b>Variables</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
Knowledge	Low	16	17.78
	Medium	40	44.44
	High	34	37.78
<b>Mean = 16.17, SD = 2.81</b>			

**Table 4.2 Knowledge level of respondents on black pepper cultivation practices**  
(n=90)

<b>Parameters</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
<b>General awareness on black pepper</b>	Low	4	4.44
	Medium	15	16.67
	High	71	78.89
<b>Mean = 2.74, SD = 0.53</b>			
<b>Nursery management</b>	Low	7	7.78
	Medium	19	21.11
	High	64	71.11
<b>Mean = 2.63, SD = 0.63</b>			
<b>Land preparation and planting</b>	Low	12	13.33
	Medium	51	56.67
	High	27	30.00
<b>Mean = 3.17, SD = 0.64</b>			
<b>Nutrient management</b>	Low	4	4.44
	Medium	14	15.56
	High	72	80.00
<b>Mean = 2.75, SD = 0.52</b>			
<b>Plant protection measures</b>	Low	36	40.00
	Medium	30	33.33
	High	24	26.67
<b>Mean = 3.70, SD = 1.09</b>			
<b>Marketing</b>	Low	14	15.56
	Medium	48	53.33
	High	28	31.11
<b>Mean = 1.16, SD = 0.67</b>			

Regarding nursery management, significantly higher per cent of respondents (71.11 %) had high level of knowledge whereas, 21.11 per cent and 7.78 per cent of respondents had medium and low level of knowledge on nursery management, respectively.

More than half of the respondents (56.67 %) had high level of knowledge with respect to land preparation and planting whereas, 30.00 per cent of respondents had medium level of knowledge and very less per cent of respondents (13.33 %) had low level of knowledge.

In case of nutrient management, considerably higher percentage of respondents (80.00 %) had high level of knowledge, followed by medium (15.56 %) and low (4.44 %) level of knowledge.

It was observed that 40.00 per cent of the respondents had low level of knowledge regarding specific plant protection measures, followed by medium (33.33 %) and high (26.67 %) knowledge.

Results of the Table 4.2 also revealed that 53.33 per cent of respondents had medium level of knowledge on marketing. Whereas, 31.11 per cent of them had high level of knowledge and only 15.56 per cent of respondents had low level of knowledge on marketing.

## **4.2 Technological gap among black pepper growers**

### **4.2.1 Overall technological gap in adoption of recommended practices of black pepper cultivation**

The results pertaining to the Table 4.3 indicated that half of the respondents (57.77 %) had medium overall technological gap, followed by high technological gap with 25.56 per cent of the respondents and 16.67 per cent of the respondents belonged to low overall technological gap category.

### **4.2.2 Technological gap in adoption of individual recommended practices of black pepper cultivation**

The data with respect to the technological gap for different practices of black pepper cultivation is presented in the Table 4.4.

It was observed that very low technological gap was found in cultivation of recommended varieties of black pepper. There was no technological gap in adopting cultivation of Panniyur-1 variety, planting time and planting runner with four eye buds. A gap of 27.78 per cent was found in cultivation of Panniyur-2 variety whereas with respect to other improved varieties, 30.00 per cent of technological gap was found.

**Table 4.3 Overall technological gap in recommended cultivation practices of black pepper**

(n=90)

<b>Variables</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
Technological gap	Low	15	16.67
	Medium	52	57.78
	High	23	25.56
<b>Mean = 36, SD = 8.79</b>			

**Table 4.4 Technological gap in adoption of recommended practices of Black Pepper cultivation**

(n=90)

SI No	Recommended practices	Mean Technological Gap (%)
<b>1</b>	<b>Varieties</b>	
a.	Panniyur-1	0.00
b.	Panniyur-2	27.78
c.	Other improved varieties	30.00
<b>2.</b>	<b>Planting time</b>	
a.	May-June	0.00
<b>3.</b>	<b>Planting Material</b>	
a.	Runner with 4 eye buds	0.00
b.	Poly bag plant	18.89
<b>4.</b>	<b>Spacing</b>	
i.	In Coffee Garden(8m*8m)	35.56
ii.	In Areca nut Garden (2.7m*2.7m)	28.89
<b>5.</b>	<b>Size of the pits for planting pepper</b>	
a.	45 cm *45 cm *45 cm	17.78
<b>6.</b>	<b>Plant population/ha</b>	
i.	Coffee Garden:156 plants/ha	36.67
ii.	Arecanut Garden :1370 plants /ha	14.44
<b>7.</b>	<b>Irrigation methods</b>	
i.	Drip irrigation	54.44
ii.	Sprinkler irrigation	23.33
<b>8.</b>	<b>Filling materials used in the pits</b>	
	3-part surface soil+2-part FYM+1 part sand+2% Trichoderma (in polythene bags)	45.56
<b>9.</b>	<b>FYM (10 Kg per vine)</b>	16.67
<b>10.A</b>	<b>Application of Fertilizers (per vine)</b>	
a.	Dosage (100:40:140 g)	7.78
b.	Time of application (May-June, August-September)	0.00
<b>10.B</b>	<b>Bio fertilizer application per vine</b>	
	50g Azospirillum + 50g PSB	88.89

**Table 4.4 Technological gap in adoption of recommended practices of Black Pepper cultivation**

			contd...
Sl. No.	Recommended practices		Mean technological gap (%)
<b>11. Measures to control the major pests</b>			
<b>Sl. No</b>	<b>Name of pest</b>	<b>Chemicals/Bio agents used for control</b>	
a.	Mealy bugs	Chlorantriliprole 18.5 EC @ 0.5 ml/l	83.33
b.	Thrips	Diamethoate 30 EC @ 1.7 ml/l Quinalphos 25 EC @ 2 ml/l Methyl Parathion 50 EC @ 1 ml/l	91.11
c.	Top shoot borer	Chlorpyrifos 20 EC @ 1.5-2.5 ml/l Monocrotophos 36 EC @ 0.5 ml/l	73.33
<b>12. Measures to control the major disease</b>			
a.	Slow wilt	Neem cake application + Phorate 10 G	46.67
b.	Quick wilt	Soil application of FYM+Trichoderma and spray of Bordeaux mixture followed by need based spray of metalaxyl	63.33
c.	Anthracnose	Spray CoC @ 0.3% or Antracol @ 0.2% or Propiconazole @ 0.1%	43.33
<b>13. Yield obtained per vine</b>			
a.	Less than 10-year vine (1.5 kg)		4.44
b.	More than 10-year vine (2 kg)		26.67
<b>14. Harvesting and processing Black Pepper</b>			
i.	When the colour of one or two berries on the spike turn red, the whole spike should be plucked		0.00
ii.	Later the berries should be dipped in boiling water for a minute to get good colour.		16.67
iii.	After those berries should be sun dried for 3-5 days		0.00
<b>15. Methods followed for pepper de-spiking</b>			
a.	Mechanical rubbing		5.56
b.	Manual rubbing		93.33
<b>16. Drying methods</b>			
a.	Sundry on cement floor		4.44
b.	Sundry on bamboo mat		100.00
c.	Sundry on tarpauline sheet		10.00
<b>17. Packing and storage</b>			
a.	Jute gunny bag with polythene lining		94.44
b.	Polythene bags		5.56
<b>18. Marketing</b>			
a.	Value addition (White pepper)		85.56
b.	Short channel		48.89
c.	Hedging		72.22
d.	Local trader		25.56

In case of spacing, 35.56 per cent of technological gap was found in following recommended spacing in coffee garden. Whereas, 28.89 per cent of technological gap was found in adopting recommended spacing in arecanut garden and there was 17.78 per cent of gap in size of the pits for planting black pepper. It was observed that there was 36.67 per cent and 14.44 per cent of technological gap in adopting recommended number of plant population in coffee garden and arecanut garden, respectively.

Higher technological gap of 54.44 per cent was found in adopting drip irrigation and 23.33 per cent gap in case of sprinkler irrigation method.

Further, it was revealed that 45.56 per cent of technological gap was observed in case of filling materials used in the pits. Less technological gap was found in application of FYM (16.67 %) and NPK (7.78 %) fertilizers. Greater technological gap of 88.89 per cent was found in bio fertilizer application.

It was found that there was high per cent of technological gap in pest control measures for thrips (91.11 %), mealy bugs (83.33 %) and top shoot borer (73.33 %). In case of disease control measures, 63.33 per cent of technological gap was found for quick wilt disease management, followed by 46.67 per cent gap for slow wilt and 43.33 per cent of gap for anthracnose disease management practices.

Lesser gap of 4.44 per cent was found in obtaining 1.5 kg yield from vines of less than 10 years whereas, 26.67 per cent of technological gap was found in obtaining more than 2 kg yield from more than 10 years old vines.

A gap of 16.67 per cent was found in following the process of dipping the berries in boiling water during processing of black pepper and no technological gap was seen in time of harvesting and drying berries.

As high as 93.33 per cent of technological gap was seen in de-spiking by manual rubbing. Cent per cent technological gap was observed in case of sundrying on bamboo mat method. Whereas, 10.00 per cent technological gap was observed in sundrying on tarpauline sheet and only 4.44 per cent gap was observed in sundrying on cement floor. It was observed that, less technological gap of 5.56 per cent was observed for packing and storage in polythene bags and higher technological gap of 94.44 per cent was observed in use of gunny bags with polythene lining for packing and storage of dried berries.

Regarding marketing, high technological gap of 85.56 per cent was observed in case of value addition in pepper, followed by 72.22 per cent gap in hedging and 48.89 per cent technological gap in following short channel for marketing. Whereas 25.56 per cent of the respondents marketed through local traders.

### **4.3 Adoption level of recommended practices in black pepper cultivation**

#### 4.3.1 Overall adoption level of the respondents on recommended cultivation practices

The data with respect to adoption level of recommended cultivation practices of black pepper furnished in the Table 4.5 revealed that majority of the respondents (57.77 %) belongs to medium overall adoption category. Whereas, 25.56 per cent respondents had low level and 16.67 per cent had high level of overall adoption category.

#### 4.3.2 Adoption level of recommended cultivation practices by black pepper growers

The results depicted in table 4.6 indicated that cent per cent of the respondents had adopted recommended variety Panniyur-1 whereas, 72.22 per cent of the respondents cultivated panniyur-2 varieties and 70.00 per cent of them adopted other improved varieties. Also, cent per cent of the respondents had adopted sowing time, planting runners with four eye buds and 81.11 per cent of them adopted poly bag planting method.

In case of spacing, 71.11 per cent of respondents adopted recommended spacing in arecanut garden, followed by 64.44 per cent in coffee garden.

Further, majority of the respondents (82.22 %) adopted recommended size of the pits for the planting pepper, whereas, 85.56 and 63.33 per cent of the respondents adopted recommended number of plant population per ha in arecanut and coffee garden, respectively.

More than three fourth of the respondents (76.67 %) adopted sprinkler irrigation and 45.56 per cent respondents adopted drip irrigation. More than half of the respondents (54.44 %) used recommended filling materials in the pits.

Majority of the respondents (83.33 %) adopted recommended dose of FYM.

Cent per cent of the respondents followed recommended time of fertilizer application and 92.22 per cent of them adopted recommended dose of NPK fertilizer. Only 11.11 per cent respondents adopted bio fertilizer application.

It can be observed from the Table 4.6 that only 8.89 per cent of the respondents adopted control measure to thrips, followed by 16.67 per cent and 26.67 per cent of respondents adopted recommended control measures for mealy bugs and top shoot borer pest management, respectively.

More than half of the respondents adopted recommended control measures for slow wilt (53.33 %) and quick wilt (56.67 %) disease management, whereas, 36.67 per cent respondents followed suitable control measure for management of anthracnose disease. Majority of the respondents (95.56 %) harvested nearly 1.5 kg of yield and 73.33 per cent respondents used to harvest more than 2 kg of pepper yield per vine from more than 10 years old crop.

**Table 4.5 Overall adoption level of the black pepper growers**

(n=90)

<b>Variables</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
Adoption	Low	23	25.56
	Medium	52	57.78
	High	15	16.67
<b>Mean = 28.31, SD = 3.42</b>			

**Table 4.6 Distribution of respondents according to adoption of recommended black pepper cultivation practices** (n = 90)

SI No	Recommended practices	Adoption	
		F	%
<b>1.</b>	<b>Varieties</b>		
a.	Panniyur-1	90	100.00
b.	Panniyur-2	65	72.22
c.	Other improved varieties	63	70.00
<b>2.</b>	<b>Planting time</b>		
a.	May-June	90	100.00
<b>3.</b>	<b>Planting Material</b>		
a.	Runner with 4 eye buds	90	100.00
b.	Poly bag plant	73	81.11
<b>4.</b>	<b>Spacing</b>		
i.	In Coffee Garden(8m*8m)	58	64.44
ii.	In Areca nut Garden (2.7m*2.7m)	64	71.11
<b>5.</b>	<b>Size of the pits for planting pepper</b>		
	45 cm *45 cm *45 cm	74	82.22
<b>6.</b>	<b>Plant population/ha</b>		
i.	Coffee Garden:156 plants/ha	57	63.33
ii.	Arecanut Garden :1370 plants /ha	77	85.56
<b>7.</b>	<b>Irrigation methods</b>		
i.	Drip irrigation	41	45.56
ii.	Sprinkler irrigation	69	76.67
<b>8.</b>	<b>Filling materials used in the pits</b>		
	3 part surface soil+2 part FYM+1 part sand+2% Trichoderma (in polythene bags)	49	54.44
<b>9.</b>	<b>FYM (10 Kg per vine)</b>	75	83.33
<b>10.A</b>	<b>Application of Fertilizers (per vine)</b>		
a.	Dosage (100:40:140 g)	85	92.22
b.	Time of application (May-June, August-September)	90	100.00
<b>10.B</b>	<b>Bio fertilizer application per vine</b>		
	50g Azospirillum + 50g PSB	10	11.11
<b>11. Measures to control the major pests</b>			
<b>Sl.No</b>	<b>Name of pest</b>	<b>Chemicals/Bio agents used for control</b>	
a.	Mealy bugs	Chlorantriliprole 18.5 EC @ 0.5 ml/l	15 16.67
b.	Thrips	Diamethoate 30 EC @ 1.7 ml/l Quinalphos 25 EC @ 2 ml/l Methyl Parathion 50 EC @ 1 ml/l	08 8.89

**Table 4.6 Distribution of respondents according to adoption of recommended black pepper cultivation practices**

contd...

Sl. No.	Recommended practices		Adoption	
			F	%
<b>12. Measures to control the major disease</b>				
a.	Slow wilt	Neem cake application + Phorate 10 G	48	53.33
b.	Quick wilt	Soil application of FYM+Trichoderma and spray of Bordeaux mixture followed by need based spray of metalaxyl	51	56.67
c.	Anthracnose	Spray CoC @ 0.3% Antracol @ 0.2% Propiconazole @ 0.1%	33	36.67
<b>13. Yield obtained per vine</b>				
a.	Less than 10 year vine (1.5 kg)		86	95.56
b.	More than 10 year vine (2 kg)		66	73.33
<b>14. Harvesting and processing Black Pepper</b>				
i.	When the colour of one or two berries on the spike turn red, the whole spike should be plucked		90	100.00
ii.	Later the berries should be dipped in boiling water for a minute to get good colour.		75	83.33
iii.	After that berries should be sun dried for 3-5 days		90	100.00
<b>15. Methods followed for pepper de-spiking</b>				
a.	Mechanical rubbing		85	94.44
b.	Manual rubbing		06	6.67
<b>16. Drying methods</b>				
a.	Sundry on cement floor		86	95.56
b.	Sundry on bamboo mat		00	0.00
c.	Sundry on tarpauline sheet		81	90.00
<b>17. Packing and storage</b>				
a.	Jute gunny bag with polythene lining		05	05.56
b.	Polythene bags		85	94.44
<b>18. Marketing</b>				
a.	Value addition (White pepper)		13	14.44
b.	Short channel		47	52.22
c.	Hedging		25	27.78
d.	Local trader		67	74.44

Cent per cent of the respondents followed suitable harvesting method. The majority of the respondents (83.33 %) used to dip berries in boiling water. For pepper de-spiking, majority of the respondents (94.44 %) followed mechanical rubbing and only 6.67 per cent respondents followed manual rubbing.

None of the respondents followed sundrying on bamboo mat. Almost all the respondents (95.56 %) followed sundrying on cement floor, whereas, 90.00 per cent respondents followed sundrying on tarpauline sheet.

Most of the respondents (94.44 %) used polythene bags for packing and storage, whereas, 5.56 per cent of respondents used jute gunny bags with polythene lining.

With respect to marketing, nearly two-third of the respondents (74.44 %) used to sell black pepper through local trader, more than half of the respondents (52.22 %) adopted short channel. Whereas, 27.78 per cent of the respondents followed hedging and only 14.44 per cent of them practiced value addition by making white pepper.

#### **4.4 Personal and socio-economic characteristics of the respondents**

##### 4.4.1 Age

The data in the Table 4.7 showed that 60.00 per cent of the respondents belonged to the middle age group, while 33.33 per cent belonged to the old age group and 6.67 per cent of them belonged to the young age group.

##### 4.4.2 Education

Data furnished in the Table 4.8 revealed that 40.00 per cent of the respondents had high school education whereas, 31.11 per cent of the respondents had pre-university/diploma education and 17.78 per cent of them were degree graduates. None of the respondents were illiterate and no one possessed post-graduate degree.

##### 4.4.3 Farming experience

It was evident from the Table 4.9 that majority of the respondents (41.11 %) had medium farming experience followed by high (35.56 %) and low (23.33 %) levels of farming experience.

##### 4.4.4 Experience in black pepper cultivation

It was observed from the Table 4.10 that exactly half of the respondents (50.00 %) had medium experience in black pepper cultivation followed by high (26.67 %) and low (23.33 %) levels of experience in black pepper cultivation, respectively.

**Table 4.7 Distribution of respondents according to age****n = 90**

<b>Sl No.</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
1	Young (< 35 years)	06	06.67
2	Middle (35 to 55 years)	54	60.00
3	Old (> 55 years)	30	33.33

**Table 4.8 Distribution of respondents according to education****n = 90**

<b>Sl No.</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
1	Illiterate (Cannot read and write)	0	0.00
2	Primary school (I - IV Standard)	01	01.11
3	Middle school (V - VII Standard)	09	10.00
4	High school (VIII - X Standard)	36	40.00
5	P.U.C/Diploma (XI - XII Standard)	28	31.11
6	Graduation (Degree)	16	17.78
7	Post graduation (Master's degree or above)	0	0.00

**Table 4.9 Distribution of respondents according to farming experience**

**n = 90**

<b>Sl No.</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
1	Low	21	23.33
2	Medium	37	41.11
3	High	32	35.56
<b>Mean = 24.91, SD = 9.95</b>			

**Table 4.10 Distribution of respondents according to experience in black pepper cultivation**

**n = 90**

<b>Sl. No.</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
1	Low	21	23.33
2	Medium	45	50.00
3	High	24	26.67
<b>Mean = 21.99, SD = 8.15</b>			

#### 4.4.5 Land holding

It was observed from Table 4.11 that 35.56 per cent of the black pepper growers belonged to semi-medium size land holding category followed by 26.67 per cent of them had small size land holding. Whereas, 20.00 per cent of the respondents belonged to medium and 13.33 per cent of them belonged to big size of land holding category. Only 4.44 per cent of respondents belonged to marginal size of land holding category.

#### 4.4.6 Annual income

Table 4.12 shows that as high as 47.78 per cent of respondents fall under medium level of annual income category. Whereas 30.00 per cent and 22.22 per cent of respondents belonged to low and high level of annual income category, respectively.

#### 4.4.7 Cropping system

It can be observed from the Table 4.13 that most of the respondents (45.55 %) followed cropping system with intercropping of black pepper and coffee. Whereas, 26.67 per cent of the respondents had intercropped black pepper along with coffee and arecanut while, 20.00 per cent of the respondents had grown black pepper with arecanut. Intercropping of black pepper with banana, arecanut and other crops such as ginger and cardamom was followed by 7.78 per cent of respondents.

#### 4.4.8 Extension contact

The findings on extension contact of the black pepper growers were presented in the Table 4.14 which indicates that 53.33 per cent of them had medium extension contact, followed by low and high extension contact of about 28.89 per cent and 17.78 per cent, respectively.

#### 4.4.9 Information seeking behavior

It is clear from the Table 4.15 that exactly half of the respondents (50.00%) fall under medium information seeking behavior category followed by low (28.89 %) and high (21.11 %) levels of information seeking behavior category.

#### 4.4.10 Economic motivation

A perusal of the data in Table 4.16 indicated that 41.11 per cent of the respondents had high economic motivation, followed by 40.00 per cent of them had medium and 18.89 per cent respondents had low economic motivation.

#### 4.4.11 Innovativeness

Table 4.17 revealed that 47.78 per cent of the respondents were having medium innovativeness whereas, 28.89 per cent of them had low innovativeness and 23.33 per cent of respondents had high innovativeness.

**Table 4.11 Distribution of respondents according to land holding****n = 90**

<b>Sl No.</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
1	Marginal farmers (up to 2.5)	04	04.44
2	Small farmers (2.51 to 5.00)	24	26.67
3	Semi-medium farmers (5.01 to 10.00)	32	35.56
4	Medium farmers (10.01 to 25)	18	20.00
5	Big farmers (above 25)	12	13.33

**Table 4.12 Distribution of respondents according to annual income****n = 90**

<b>Sl No.</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
1	Low	27	30.00
2	Medium	43	47.78
3	High	20	22.22
<b>Mean = 1506777.78, SD = 1416084.03</b>			

**Table 4.13 Distribution of respondents according to cropping system****n = 90**

<b>Sl No.</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
1	Arecanut + Black pepper	18	20.00
2	Black pepper + Coffee	41	45.55
3	Arecanut + Black + Coffee	24	26.67
4	Arecanut + Black pepper + coffee + other crops	07	07.78

**Table 4.14 Distribution of respondents according to extension contact****n = 90**

<b>Sl No.</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
1	Low	26	28.89
2	Medium	48	53.33
3	High	16	17.78
<b>Mean = 3.49, SD = 1.50</b>			

**Table 4.15 Distribution of respondents according to information seeking behaviour**

**n = 90**

<b>Sl No.</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
1	Low	26	28.89
2	Medium	45	50.00
3	High	19	21.11
<b>Mean = 12.45, SD = 3.25</b>			

**Table 4.16 Distribution of respondents according to economic motivation**

**n = 90**

<b>Sl No.</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
1	Low	17	18.89
2	Medium	36	40.00
3	High	37	41.11
<b>Mean = 9.88, SD = 1.88</b>			

**Table 4.17 Distribution of respondents according to innovativeness**

**n = 90**

<b>Sl No.</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
1	Low	26	28.89
2	Medium	43	47.78
3	High	21	23.33
<b>Mean = 15.15, SD = 3.24</b>			

#### 4.4.12 Management orientation

It was observed from the Table 4.18 that more than half of the respondents (53.33 %) belonged to medium management orientation followed by high (30.00 %) and low (16.67 %) levels of management orientation.

### **4.5 Association between dependent variables and independent variables of the respondents**

#### 4.5.1 Association between knowledge level of black pepper cultivation and independent variables of the respondents

Table 4.19 presented the details of association between knowledge level of black pepper cultivation and independent variables of the respondents. The variables education, farming experience, experience in black pepper cultivation, annual income, extension contact, economic motivation and innovativeness showed association with knowledge level of respondents at 1 per cent level of significance. Whereas, age and information seeking behavior showed association with knowledge level at 5 per cent level of significance. Variables such as land holding and cropping system had no association with the knowledge level of black pepper growers.

#### 4.5.2 Association of technological gap in black pepper cultivation practices and independent variables of the respondents

The data presented in the Table 4.20 provides information about the association of technological gap in black pepper cultivation practices and independent variables of the respondents. The variables such as age, education, farming experience, annual income, extension contact, information seeking behavior and management orientation had no association with technological gap in black pepper cultivation practices. Whereas, land holding and economic motivation showed association at 1 per cent level of significance. Also, the variables such as experience in black pepper cultivation, cropping system and innovativeness had association with technological gap at 5 per cent level of significance.

**Table 4.18 Distribution of respondents according to management orientation**

**n = 90**

<b>Sl No.</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>
1	Low	15	16.67
2	Medium	48	53.33
3	High	27	30.00
<b>Mean = 10.11, SD = 1.26</b>			

**Table 4.19 Association between knowledge level of black pepper cultivation practices and independent variables of the respondents**

(n=90)

Sl. No.	Independent variables	p-value	Chi-square statistic
1	Age	0.011	12.960 <sup>*</sup>
2	Education	0.005	14.908 <sup>**</sup>
3	Land holding	0.268	5.199 <sup>NS</sup>
4	Farming experience	0.001	26.971 <sup>**</sup>
5	Annual income	0.002	16.990 <sup>**</sup>
6	Cropping System	0.488	3.435 <sup>NS</sup>
7	Extension contact	0.007	14.091 <sup>**</sup>
8	Information seeking behavior	0.018	11.932 <sup>*</sup>
8	Economic motivation	0.007	14.067 <sup>**</sup>
11	Innovativeness	0.003	16.293 <sup>**</sup>
13	Management orientation	0.001	27.711 <sup>**</sup>

\* Significant at 5% level of probability

\*\* Significant at 1% level of probability

<sup>NS</sup>– Non significant

**Table 4.20 Association between technological gap in black pepper cultivation practices and independent variables of the respondents**

(n=90)

Sl. No.	Independent variables	p-value	Chi-square statistic
1	Age	0.728	2.043 <sup>NS</sup>
2	Education	0.905	1.031 <sup>NS</sup>
3	Land holding	0.001	20.781 <sup>**</sup>
4	Farming experience	0.369	4.280 <sup>NS</sup>
5	Annual income	0.540	9.299 <sup>NS</sup>
6	Cropping System	0.017	12.069 <sup>*</sup>
7	Extension contact	0.335	4.568 <sup>NS</sup>
8	Information seeking behaviour	0.094	7.933 <sup>NS</sup>
9	Economic motivation	0.001	0.516 <sup>**</sup>
10	Innovativeness	0.018	11.964 <sup>*</sup>
11	Management orientation	0.084	8.221 <sup>NS</sup>

\* Significant at 5% level of probability

\*\* Significant at 1% level of probability

<sup>NS</sup>– Non significant

## **4.6 Constraints faced by the farmers**

### ***4.6.1 Constraints faced by the respondents***

Garrett ranking technique was used to assess the constraints faced by black pepper growers in adoption of recommended cultivation practices. It was observed from the Table 4.21 that majority of the black pepper growers (79.27 %) expressed non-availability of pest and disease resistant varieties, followed by lower price of the product (70.44 %) as the major constraint. More than half of the respondents expressed increased labor wages (67.83 %), high cost of inputs (59.60 %), lack of timely advisory services and market information (57.11 %), poor transportation and storage facilities (52.29 %) as major constraints. Other constraints include destruction of vines by wild animals (50.87 %) and heavy rainfall and erratic weather conditions (47.46 %).

### **4.7 Suggestions to overcome the constraints**

Table 4.22 depicted the suggestions given by the respondents to overcome the problems. Majority of the respondents (80.00 %) suggested for development and supply of disease resistant varieties in time. More than half of the respondents (68.89 %) suggested for provision of timely advisory services. Other suggestions include organizing awareness programs related to disease management (47.78 %), improvement of storage and transportation facilities in rural areas (42.22 %) and formation of FPOs (34.44 %).

### **4.8 Documentation of the success stories of the selected black pepper growers**

The success stories of the selected black pepper growers were documented in detail in the discussion chapter.

**Table 4.21 Constraints faced by the black pepper growers**

<b>Sl No</b>	<b>Constraints</b>	<b>Garrett Score</b>	<b>Rank</b>
1	Non-availability of disease resistant varieties	79.27	I
2	Fluctuation of prices or lower prices	70.44	II
3	Increased labor wages	67.83	III
4	High cost of inputs	59.60	IV
5	Lack of timely advisory services and market information	57.11	V
6	Poor transportation and storage facilities	52.29	VI
7	Destruction of vines by wild animals	50.87	VII
8	Heavy rainfall and erratic weather conditions	47.46	VIII

**Table 4.22 Suggestions to overcome constraints**

<b>Sl No</b>	<b>Suggestions</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Rank</b>
1	Development and supply of disease resistant varieties	72	80.00	I
2	Providing timely advisory services	62	68.89	II
3	Organizing awareness programs related to disease management	43	47.78	III
4	Improvement in storage and transportation facilities	38	42.22	IV
5	Formation of FPOs	31	34.44	V



**Plate 3: Researcher during data collection at Koppa**



**Plate 4: Researcher during data collection at Koppa**



**Plate 5: Researcher during data collection at Mudigere**



**Plate 6: Researcher during data collection with farmers of Mudigere**

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## ***DISCUSSION***

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## V DISCUSSION

The results of the present study have been discussed in detail. The possible reasons are discussed and are presented in this chapter under the following headings:

- 5.1 Knowledge level of pepper growers about improved cultivation practices
- 5.2 Extent of technological gap in pepper cultivation practices
- 5.3 Extent of adoption in black pepper cultivation practices
- 5.4 Personal and socio-economic characteristics of respondents
- 5.5 Association of dependent variables with independent variables of the respondents
- 5.6 Constraints faced by black pepper growers
- 5.7 Suggestions expressed by black pepper growers
- 5.8 Success stories of black pepper growers

### **5.1 Knowledge level of respondents on black pepper cultivation practices**

#### 5.1.1 Overall Knowledge level of respondents about improved cultivation practices

A perusal of the data from Figure 3 indicated the overall knowledge level of the respondents about recommended cultivation practices. Forty respondents (44.44 %) had medium level of overall knowledge about recommended cultivation practices of black pepper followed by thirty four (37.78 %) of them had high overall knowledge level (Fig 3). The probable reasons for possessing medium to high level of knowledge could be due to possession of medium to high farming experience *i.e.*, 20 to 30 years. The respondents were also having more than 17 years of experience in black pepper cultivation. Chikkamagaluru district being the traditional area for black pepper cultivation, the respondents have been exposed to the pepper cultivation activities from their young age, high returns from the crop motivated them to acquire knowledge. The other factors for the result include good formal education, extension contact with the scientists of ZAHRS and KVK, Mudigere in addition to extension staff of horticulture department and Spices Board. The respondents also have medium level of innovativeness and information seeking behaviour.

#### 5.1.2 Knowledge level of the respondents about recommended cultivation practices

Table 4.2 presented the data on knowledge level of respondents about individual cultivation practices.

Results of the study shows that majority (78.89 %) of the respondents had high knowledge regarding general awareness on black pepper cultivation practices. Whereas, 16.67 per cent of respondents had medium knowledge level. As black

pepper is a traditional cash crop which is more commonly cultivated by almost all the farmers of the study area. This results in general awareness about the crop.

Regarding nursery management, significantly higher per cent of respondents (71.11 %) of the respondents had high knowledge whereas, 21.11 per cent of respondents had medium knowledge. The reason may be that many respondents prepare black pepper nursery on their own as they require cuttings every year for replacing the damaged vines due to incidence of diseases, hence gained the knowledge about nursery management.

More than half of the respondents (56.67 %) had medium level of knowledge with respect to land preparation and planting whereas, 30.00 per cent respondents had high level of knowledge as these are the simple traditional practices that are compulsorily followed by them over the years through experience.

In case of nutrient management, considerably higher per cent of respondents (80.00 %) had high knowledge, followed by medium (15.56 %) level of knowledge. Since majority of the respondents were well aware about importance of nutrient management in plant growth and yield. Also, the awareness programmes and advertisements made by fertilizer companies in various media contributed for acquisition of knowledge.

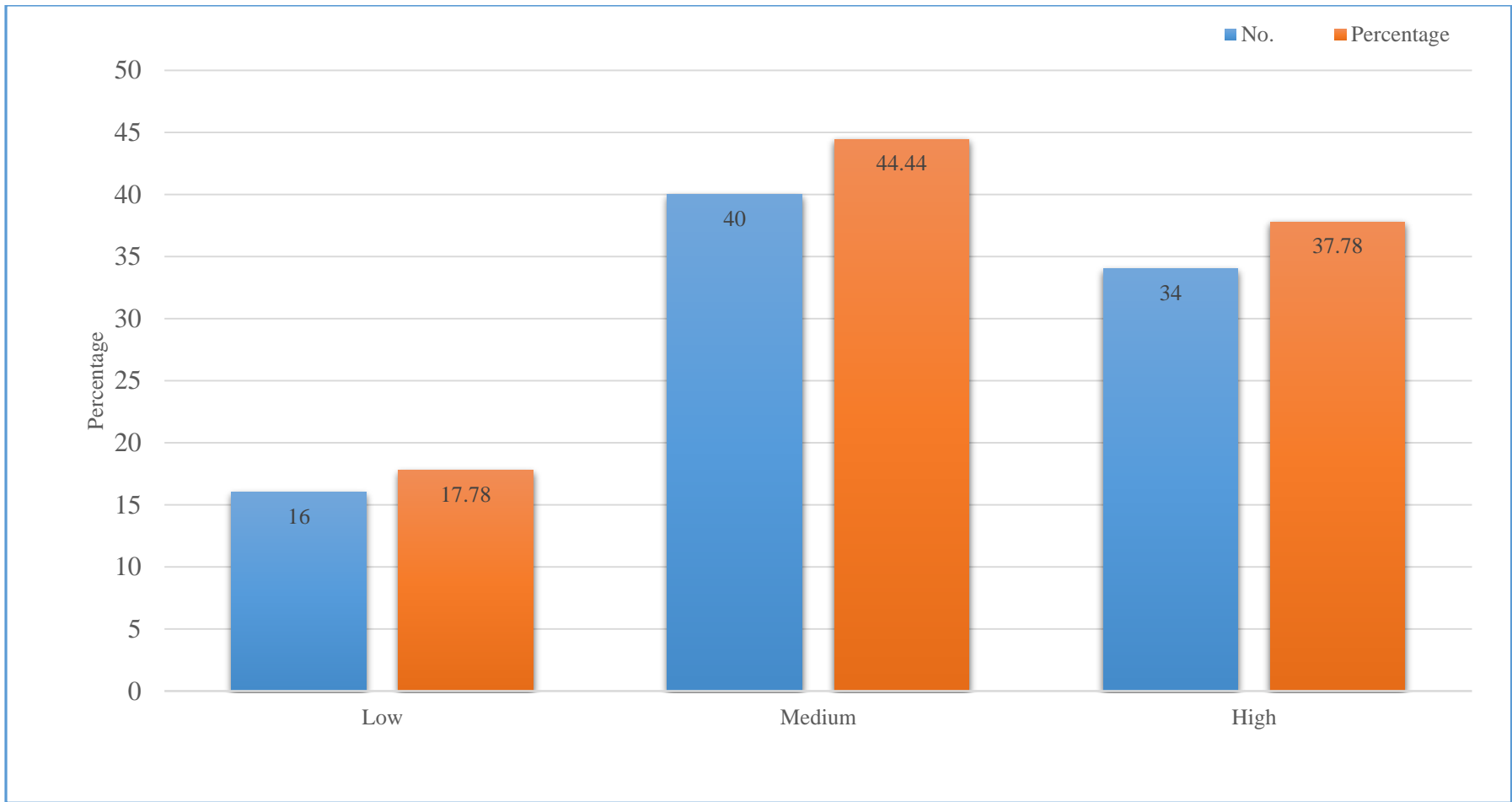
It was observed that 40.00 per cent of the respondents had low knowledge regarding plant protection measures. Since the malnad area is of organic growing belt, farmers are willing to go for non chemical management of pest and diseases, they leave for environment to correct this. On the contrary, there is incidence of slow and quick wilt diseases for which the results of chemical control measures are not satisfactory. The farmers had the opinion that replacement of vines is the only solution for this problem which resulted into possession of low level knowledge on plant protection measures.

Results of the Table 4.2 also revealed that 53.33 per cent of respondents had medium knowledge on marketing whereas 31.11 per cent of them had high knowledge on marketing. The reason might be that majority of the respondents had better education, fairly good communication and internet access which helped them to gain knowledge about marketing of black pepper.

## **5.2 Extent of technological gap in black pepper cultivation practices**

### **5.2.1 Overall technological gap among pepper growers about black pepper cultivation practices**

The results from the Figure 4 indicated that half of the respondents (57.77 %) had medium overall technological gap, followed by high technological gap with 25.56 per cent of the respondents overall technological gap category. The reasons



**Fig. 3: Overall knowledge level of respondents on black pepper cultivation practices**

contributing for medium to high overall technological gap are due to more technological gap in adopting certain recommended practices such as maintenance of spacing and plant population in the garden, irrigation method, filling materials used in the pits, bio fertilizer application and pest and disease control measures. Also, huge technological gap noticed in method of pepper de-spiking, drying, storage and marketing have contributed for such trend of results. On the other hand, low (16.67 %) technological gap was observed among fifteen respondents. Possible contributing factors include adoption of recommended variety, planting time, planting material, FYM and fertilizer application and harvesting method.

The results of the study are in agreement with the findings of Gohil *et al.* (2017), Sabi (2014), Ajeet (2015), Markana *et al.* (2016) and Parasar *et al.* (2020).

### 5.2.2 Technological gap with respect to individual pepper cultivation practices

Table 4.4 highlighted the results of the technological gap of the respondents regarding individual recommended pepper cultivation practices by the respondents.

It was observed that very less technological gap was found in cultivation of recommended varieties of black pepper. There was no technological gap in adopting cultivation of Panniyur-1 variety. Since it is the popular variety suited the particular agro-climatic region with the characteristics of large berries, very high yielding potential, more availability of cuttings, all the growers had adopted the cultivation of particular variety. Around 30.00 per cent technological gap was found in cultivation of Panniyur-2 and other improved varieties as these varieties are used for replacing the damaged vines as gap filling.

Since most of the respondents had established garden, due to assured rain in the month of May-June and available irrigation facilities, there was no technological gap in planting time.

No technological gap was observed in planting runner with four eye buds as it is the common practice followed by all the respondents and due to easy availability of the planting material from the old vines in the garden. Less than 20.00 per cent technological gap was found for use of poly bag plant as planting material as these respondents planted four to five cuttings directly near the stem of standards in the main garden itself.

In case of spacing, 35.56 per cent of technological gap was found regarding following the recommended spacing in coffee garden. Whereas, 28.89 per cent of technological gap was found in adopting recommended spacing in arecanut garden. It was also observed that there was 36.67 per cent and 14.44 per cent of technological gap in adopting recommended number of plant population in coffee and arecanut garden, respectively. The possible reason for technological gap in following recommended spacing and plant population is due to the fact that black pepper is not

cultivated as sole crop. It is cultivated in the already established coffee and areca plantations. In case of coffee plantations, it is grown by using shade trees as live standards and in case of arecanut plantations, the arecanut tree is used as standard. Since it is difficult to maintain recommended spacing and plant population, so the technology gap exists.

There was 17.78 per cent of technological gap in size of the pits for planting black pepper. In order to avoid damage to the roots of the standard, these respondents practised shallow depth of pits.

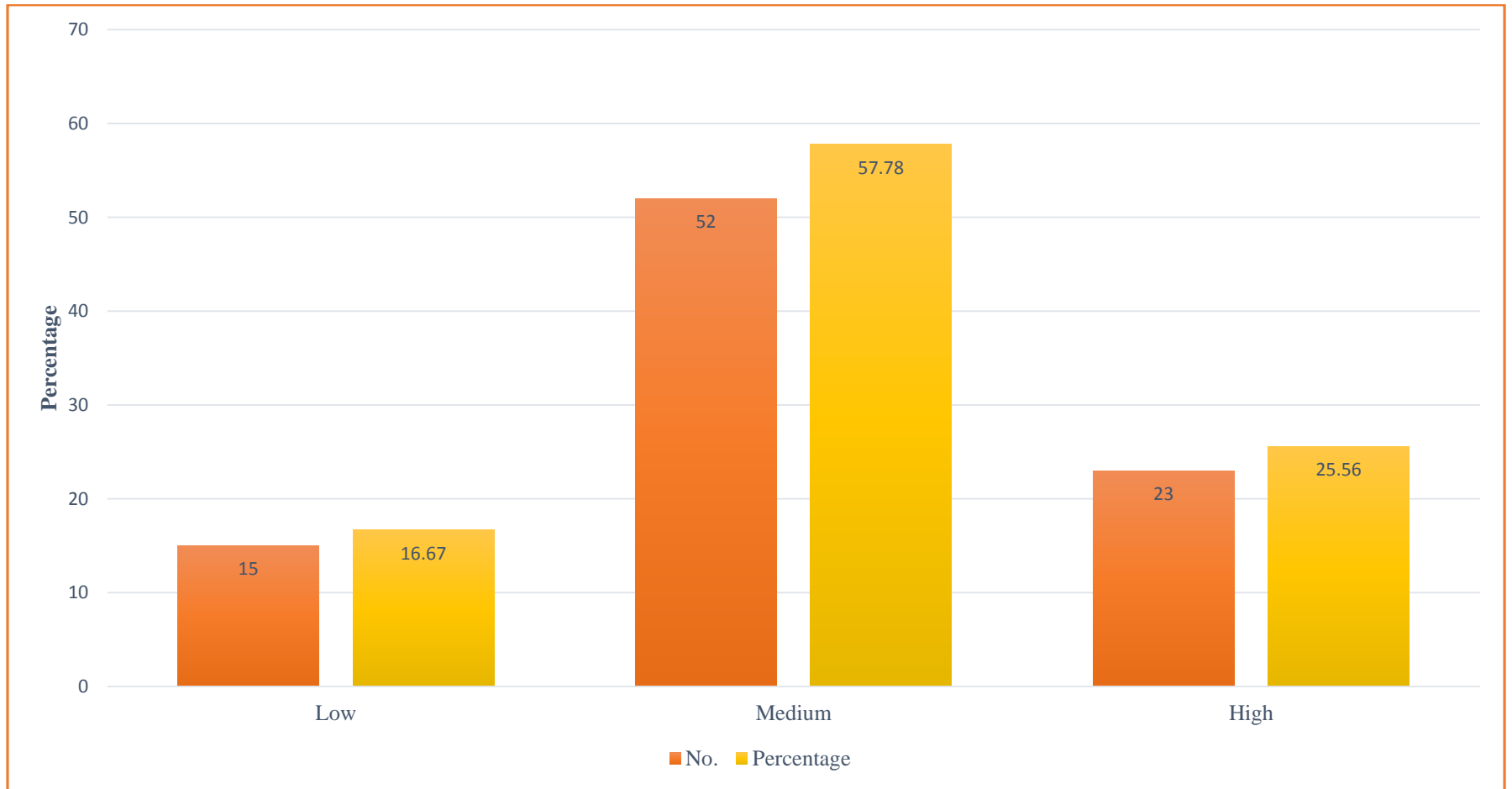
Higher technological gap of 54.44 per cent was found in adopting drip irrigation and 23.33 per cent gap in case of sprinkler irrigation method. The possible reasons could be that black pepper is a spice crop grown in plantations along with coffee, arecanut and other perennial crops and the region has more undulation and elevations, where it is difficult to install and manage drip irrigation system. In addition to this, growing of the crop under rainfed condition due to assured rainfall and following of flood irrigation by some of the respondents where there is less undulated landscape.

Further, the results revealed that 45.56 per cent technological gap was observed in case of filling materials used in the pits (3 part surface soil + 2 part FYM + 1 part sand + 2 % Trichoderma). Since the respondents had less knowledge about the advantages of trichoderma and some felt it as extra work and unimportant to be used in filling material. Also, non availability of bio-fertilizers and FYM locally in sufficient quantity, high cost of FYM and non-availability of livestock component in IFS was the reason for not using as filling materials.

Less technological gap was found in application of FYM (16.67 %) and NPK (7.78 %) fertilizers. Greater technological gap of 88.89 per cent was found in bio-fertilizer application. The possible reason might be lack of knowledge, non availability of organic manure and high transportation cost. Although farmers used to maintain lot of cattles earlier, but at present due the high maintenance cost and labour scarcity they are not maintaining the cattle. The possible reason for technological gap in use of chemical fertilizers is due to application of fertilizer for standards instead of exclusive application to the black pepper vines.

It was found that there was high per cent of technological gap in pest control measures for thrips (91.11 %), mealy bugs (83.33 %) and top shoot borer (73.33 %). The respondents focus on disease management rather than pest control as the damage caused by diseases leads to complete death of the vines. Hence, the farmers didn't showed interest to manage the pest population.

In case of disease control measures, 63.33 per cent of technological gap was found for quick wilt disease management, followed by 46.67 per cent gap for slow



**Fig. 4: Overall technological gap of respondents on black pepper cultivation practices**

wilt and 43.33 per cent of gap for anthracnose disease management. At present, slow wilt and quick wilt are the devastating diseases especially in the region of Chikkamagaluru and Mudigere. Chemical methods are not so effective against these diseases, whereas biological method is recommended by the University. The farmers follow the practice of removing the diseased vines and replace it with new vine wherever the severity of the diseases is found. Farmers maintain black pepper nursery and replace five to ten per cent of diseased vines every year.

Lesser gap of 4.44 per cent was found in obtaining 1.5 kg yield from vines of less than 10 years whereas, 26.67 per cent of technological gap was found in obtaining more than 2 kg yield from more than 10 years old vines. Yield gap was not found in old age vines where the length of the vine is more than 10 feet. On the contrary, technological gap was observed in new vines where there is a less canopy.

A gap of 16.67 per cent was found in following the process of dipping berries in boiling water during processing of black pepper and no technological gap was seen in time of harvesting and drying berries. Since the respondents follow all the practices related to processing except dipping in boiling water.

As high as 93.33 per cent technological gap was seen in de-spiking by manual rubbing. Most of the respondents adopted mechanical rubbing with rented deconing machine because of high cost of labours and lack of skilled labours. Cent per cent technological gap was observed in case of sun-drying on bamboo mat method as all the respondents possess cement drying yard for drying of agricultural commodities like arecanut, coffee, paddy, *etc.*

It was observed that, around 5.56 per cent of technological gap was observed for packing and storage in polythene bags and higher technological gap of 94.44 per cent was observed in use of gunny bags for packing and storage of dried berries since the cost of gunny bags was higher than polythene bags. Additional reason for use of polythene bags over gunny bags is due to avoiding of absorption of moisture as the area is known for heavy rainfall and cool weather.

High technological gap of 85.56 per cent was observed in case of value addition in pepper. Making of white pepper requires additional labour and time hence there was gap in value addition for black pepper. Majority of the respondents could not wait till the time of making white pepper because of their financial needs.

Regarding marketing, 72.22 per cent gap in hedging and 48.89 per cent technological gap in following short channel for marketing. Urgent need of money to meet day to day expenditures and purchase of inputs on credit basis are the contributing reasons for technological gap in hedging.

### **5.3 Extent of adoption in black pepper cultivation practices**

#### ***5.3.1 Overall adoption of recommended practices in black pepper cultivation***

Adequate knowledge about recommended package of practices is the pre-requisite for use in cultivation of crops. It is a fact that, recommended practices are major contributing factors to yield. So, inadequate knowledge about recommended practices leads to their improper adoption. The farmers were not fully aware of the filling materials to be used in pits, application of FYM and chemical fertilizers and bio-fertilizer, pest and disease control measures. These are the being complex practices and require more education about these practices in more practical way.

It is seen from the Table 4.5 that majority of the respondents (57.77 %) possessed medium overall adoption level. Whereas, 25.56 per cent respondents had low level and 16.67 per cent had high level of overall adoption. More than half of the respondents had adopted recommended varieties, planting method, spacing, plant population, filling materials, fertilizer application, harvesting and processing methods. Whereas, less adoption was found in practicing the recommended pest and disease control measures, use of bio-fertilizers, following drip irrigation, manual de-spiking, bamboo mat method of drying, use of gunny bags with polythene lining for storage, value addition of pepper and marketing methods.

The above results are in line with the findings of Parushni (2017) and Vishal (2017).

#### ***5.3.2 Extent of adoption with respect to individual pepper cultivation practices***

The results depicted in Table 4.6 indicated that cent per cent of the respondents had adopted recommended variety Panniyur-1 whereas, 72.22 per cent of the respondents cultivated panniyur-2 and 70.00 per cent of them adopted other improved varieties. Also, cent per cent of the respondents had adopted planting time, runners with four eye buds and 81.11 per cent of them adopted poly bag planting method.

In case of spacing, 71.11 per cent of respondents adopted recommended spacing in arecanut garden, followed by 64.44 per cent in coffee garden.

Further, majority of the respondents (82.22 %) adopted recommended size of the pits for the planting, whereas, 85.56 and 63.33 per cent of the respondents adopted recommended plant population in arecanut and coffee garden, respectively.

Three fourth of the respondents (76.67 %) adopted sprinkler irrigation and 45.56 per cent respondents adopted drip irrigation. More than half of the respondents (54.44 %) used recommended filling materials in the pits.

Majority of the respondents (83.33 %) adopted recommended dose of FYM. Cent per cent of the respondents followed recommended time of fertilizer application

and 92.22 per cent of them adopted recommended dose of NPK fertilizer. Only 11.11 per cent respondents adopted bio fertilizer application. Since majority of the respondents had high level of knowledge in nutrient management and they might have known the importance of application of fertilizers with right dose and right time. It can be observed from the Table 4.6 that only 8.89 per cent of the respondents adopted control measure to thrips, followed by 16.67 per cent and 26.67 per cent of respondents adopted recommended control measures for mealy bugs and top shoot borer pest management, respectively. More than half of the respondents adopted recommended control measures for slow wilt (53.33 %) and quick wilt (56.67 %) management, whereas, 36.67 per cent of respondents followed suitable control measures for anthracnose management. The respondents were not fully aware of the filling materials to be used in pits, application of FYM and chemical fertilizers and bio fertilizer, pest and disease control measures. These are the being complex practices and require additional education about these practices in more practical way.

Cent per cent of the respondents followed suitable harvest method and sun drying for black pepper and majority of the respondents (83.33 %) used to dip the berries in boiling water. Also, after harvesting the berries, the respondents used to heap the berries, sprinkle water and cover it with black tarpaulin sheet so that the berries get good colour. For pepper de-spiking, majority of the respondents (94.44 %) followed mechanical rubbing and only 6.67 per cent respondents followed manual rubbing. Deconing machine was available on rent basis by which respondents could save time and labour cost.

Most of the respondents (94.44 %) used polythene bags for packing and storage, whereas, 5.56 per cent of respondents used jute gunny bags. Even though the gunny bags have advantage, almost all the respondents used polythene bags since gunny bags were costly.

With respect to marketing, nearly two-third of the respondents (74.44 %) used to sell black pepper through local trader, more than half of the respondents (52.22 %) adopted short channel. Whereas, 27.78 per cent of the respondents followed hedging and only 14.44 per cent of them practiced value addition by making white pepper. Since most of the respondents had medium knowledge in marketing and the problem of transportation facilities, majority of them used to sell the produce to local traders.

## **5.4 Personal and socio-economic characteristics of respondents**

### **5.4.1 Age**

The results presented in Table 4.7 revealed that 60.00 per cent of respondents were found to be in middle aged category (35-55 years). About 33.33 per cent of the respondents belonged to old age category (>55 years) and 6.67 per cent of the respondents belonged to young age category (up to 35 years). The farmers of middle

age are more curious and innovative to adopt new technologies. They are more enthusiastic and energetic to beat the risks with more physical vigour, have more black pepper cultivation experience and more sense of family responsibilities than young and old age ones. This might be the reason that majority of farmers in the middle age group. The results are in line with the findings of Navyasshree (2016), Parushni (2017) and Subhash (2020).

#### 5.4.2 Education

It is clear from the Table 4.8 that 40.00 per cent of the respondents had high school education while, none of them were illiterate. The other respondents were educated up to PUC (31.11%), graduation (17.78 %), middle school (10.00 %) and none of them were post-graduated. This might be because of the more awareness about importance of education in their family, efforts of the government to provide basic education to all rural people which includes location of schools in every village and different ongoing educational programmes like Mid day meal, Sarva Shiksha Abhiyana, free and compulsory education have attracted rural people.

The rural social environment may be the major cause for such trend regarding higher studies. As the rural people are still traditional bound and they generally do not prefer to send their children to colleges and they expect their children to assist in farm and house hold activities. The long distance of higher study centres from village might have prevented the parents from providing higher education to their children. These findings are in line with the results of Subhash (2020) and Yadav *et al.* (2020).

#### 5.4.3 Farming experience

The results in Table 4.9 indicated that 41.11 per cent of the respondents had medium farming experience while 35.56 per cent of the respondents had high farming experience and 23.33 per cent of the respondents had low farming experience. It can be observed from the results that majority of pepper growers were middle to old aged and most of them have practiced farming after completion of high school education itself. So, majority of respondent had medium level experience in pepper cultivation. This result has the support with the findings of Dodiya (2014) and Subhash (2020).

#### 5.4.4 Experience in black pepper cultivation

It was observed from the Table 4.10 that exactly half of the respondents (50.00 %) had medium experience in black pepper cultivation followed by high (26.67 %) and low (23.33 %) levels of experience in black pepper cultivation, respectively. Results revealed that majority of the black pepper growers were middle and old aged and most of them have started black pepper cultivation in their early age itself. So, majority of respondent had medium level experience in pepper cultivation.

#### 5.4.5 Land holding

The data presented in Table 4.11 revealed that, 35.56 per cent of the respondents belonged to semi-medium land holding category (5.01-10.00 acres), while 26.67 per cent of them belonged to small land holding category (2.51 – 5.0 acres). Whereas 20.00 per cent of them were medium farmers (10.01-25.00 acres), followed by big farmers (13.33 %) and marginal farmers (4.44 %). The possible reason might be that due to increase in family members, the fragmentation of ancestors' property from generation to generation might have led to semi-medium and small land holdings. The above mentioned findings are in consonance with the results of Jamanal (2017) and Leelavathi (2017).

#### 5.4.6 Annual income

The results regarding the annual income of the respondents in Table 4.12 indicated that 47.78 per cent had medium level of annual income. The possible reason might be that, majority of the pepper growers belonged to medium, semi-medium and small holdings category and hence these factors might have contributed for such kind of result. It is also found that, 30.00 per cent of respondents belonged to low income group. It may be due to their lower socio-economic status, small sized land holding and might not be having other sources of income. The above findings are in conformity with the findings Ganesh (2012), Vinayak Narayan Nayak (2014) and Leelavathi (2017).

#### 5.4.7 Cropping system

Results of the Table 4.13 showed that most of the respondents (45.55 %) followed cropping system with intercropping of black pepper and coffee. This trend was mostly observed in Mudigere taluk. Whereas, 26.67 per cent of the respondents had intercropped black pepper along with coffee and arecanut, while 20.00 per cent of the respondents had grown black pepper with arecanut. The agro-climatic conditions of the study area was more suitable for cultivation of black pepper, coffee, arecanut, cardamom, *etc.* as these crops are adapted to region and cultivated since long back.

#### 5.4.8 Extension contact

The contents expressed in Table 4.14 indicated that, 53.33 per cent of respondents belonged to medium extension contact category and 17.78 per cent of respondents belonged to high extension contact category. The reason might be that, the respondents have been assured that these extension contacts are for their own welfare from which they can get appropriate knowledge, accurate information and clarify their doubts about cultivation practices.

In contrary, some of the respondents had low extension contact (28.89 %), the possible reason could be lack of interest, busy schedule of work as and the extension

agent might not be available to the respondents during their office visit. Lack of respondent's contact with extension personnel and his ignorance might be the other reason for low level extension contact.

The above results are in conformity with the findings of Chethan (2011), Pavan Kumar (2018) and Gautam *et al.* (2015).

#### 5.4.9 Information seeking behaviour

The results depicted in Table 4.15 revealed that half of the respondents (50.00 %) fall under medium information seeking behaviour category followed by low (28.89 %) and high (21.11 %) levels of information seeking behaviour category. The educational qualification of the respondents might have contributed to this kind of result. Majority of the respondents are seeking information regarding black pepper cultivation from informal sources like elder family members, progressive farmers, neighbours and friends or relatives. This might be due the reason that they will be available all the time and respondents believe them as they have primary relationship among them. And also, some of the respondents are seeking information from Horticulture officer, contact farmers and Scientists from KVK, Mudigere or KSNUAHS, Shivamogga to update themselves with recent technologies, appropriate information and general awareness. This finding was in conformity with the results of Subhash (2020).

#### 5.4.10 Economic motivation

The data in Table 4.16 indicated that 41.11 per cent of the respondents had high economic motivation, followed by 40.00 per cent of them had medium and 18.89 per cent of the respondents had low economic motivation. Black pepper being a perennial crop, assures higher returns by adopting improved cultivation practices. Continuous additional income from the crop might have contributed for respondent's high level of economic motivation. Also, the other possible reason for high to medium level economic motivation might be due to the urge to become economically sound to lead a comfortable life with their families. The above cited results are in line with the findings of Puneeth (2016).

#### 5.4.11 Innovativeness

Results of the Table 4.17 showed that 47.78 per cent of the respondents belonged to medium level of innovativeness followed by low (28.89 %) and high (23.33 %) level of innovativeness. As majority of the respondents were of middle age group with formal education, had high knowledge level about black pepper which might have helped them to understand and try new technologies. The reason for low innovativeness might be due to lack of interest and faith of success among the respondents to try out new things or technologies on their farms. These results were in conformity with the findings of Subhash (2020).

#### 5.4.12 Management orientation

It can be seen from the Table 4.18 that more than half of the respondents (53.33 %) belonged to medium management orientation followed by high (30.00 %) and low (16.67 %) levels of management orientation. Reasons might be that respondents had knowledge on black pepper cultivation from their ancestral period and being a perennial crop, they might have found that better management of farm would fetch more benefits to them. Also, majority of the respondents were middle aged having high school to pre-university level of education and medium to high farming experience.

The findings are in line with the results of Lokhande (2010) and Puneeth (2016).

### **5.5 Association of dependent variables with independent variables of the respondents**

#### 5.5.1 Association between knowledge level of black pepper cultivation practices and independent variables of the respondents

Table 4.19 presents the details of association between knowledge level of black pepper cultivation and independent variables of the respondents. The variables education, farming experience, experience in black pepper cultivation, annual income, extension contact, economic motivation and innovativeness showed association with knowledge level of respondents at 1 per cent level of significance. Whereas, age and information seeking behaviour showed association with knowledge level at 5 per cent level of significance. With increase in age, formal education, farming experience, extension contact, information seeking behaviour and innovativeness, the respondents gain more knowledge regarding black pepper. Variables such as land holding and cropping system had no association with the knowledge level of black pepper growers.

The explanation for the independent variables having significant to highly significant association with the knowledge level is given in ensuing paragraphs.

##### 5.5.1.1 Extension contact and knowledge level

It is evident from the results that extension contact had positive and significant association with knowledge of the respondents. Extension contact would help the respondents to expose themselves to improved farm technologies promoted by the extension workers. Frequent contact with the extension workers and the department officers would motivate respondents to acquire and adopt improved practices.

##### 5.5.1.2 Economic motivation and knowledge level

A perusal of the results indicates a positive and significant association between economic motivation and knowledge level of the respondents. If

responsibility of a farmer to earn more money for meeting his family needs increases, then such farmers try to involve in gaining information on new technologies which ensures more profit. The respondents gained recent knowledge on black pepper cultivation practices with a motive to enhance production level and farm income.

#### 5.5.1.3 Innovativeness and knowledge level

Results indicated that innovativeness showed positive and highly significant association with the knowledge level of the respondents. Innovativeness is associated with acquiring new ideas leading to enhanced knowledge. Hence, the respondents who were more innovative, they possess high knowledge level.

#### 5.5.2 Association of technological gap in black pepper cultivation practices and independent variables of the respondents

The data present in the Table 4.20 provides information about the association of technological gap in black pepper cultivation practices and independent variables of the respondents. The variables such as age, education, farming experience, annual income, extension contact, information seeking behavior and management orientation had no association with technological gap in black pepper cultivation practices.

Whereas, land holding and economic motivation showed association at 1 per cent level of significance. Also, the variables experience in black pepper cultivation, cropping system and innovativeness had association with technological gap at 5 per cent level of significance.

##### 5.5.2.1 Economic motivation and technological gap

It is evident from the results that economic motivation had highly significant relationship with the technological gap. Economic motivation is an indication that the individuals are oriented towards achievement of maximum economic returns like maximization of farm profits. The positive and significant relationship clearly shows that respondents with higher economic motivation tend to adopt the recommended practices and have less technological gap about black pepper cultivation practices.

##### 5.5.2.2 Age and technological gap

It was found from the results that age of the respondents showed non-significant relationship with the technological gap. The technological gap may be more or less in both old age and young age farmers. A young age farmer may not have proper knowledge on all the practices or sometimes he might follow all the recommended practices and have less technological gap and vice-versa. Hence technological gap does not depend on age of the respondents.

### 5.5.2.3 Extension contact and technological gap

The data revealed that extension contact is significant with the adoption level of the respondents. Extension contact would always provide updated information and about new technologies and would solve the problems of the farmers with proper guidance. Contacting the extension workers would create interest and help the respondents to gain and adopt improved practices and hence reduce technological gap.

## **5.6 Constraints faced by the farmers**

Most of the black pepper growers (79.27 %) expressed non-availability of pest and disease resistant varieties as the major constraint. The existing varieties such as Panniyur series and Karimunda are susceptible to wilt diseases. Other constraints include lower price (70.44 %) in recent days due to government policies and interference of middle men in the marketing system. The respondents expressed that there was lot of variation in the prices that prevail at the beginning of the season and that prevail at the time of harvesting. Since, there is no firm assurance of price in the initial stages; the farmers naturally hesitate to adopt recommended practices which involve additional investment.

Increased labour wages (67.83 %) expressed as constraint by more than half of the respondents. Due to increased cost of living, demand for labour during peak season and use of skilled labour for harvest of the crop leads to increased wages. The problem of high cost of inputs was expressed by 59.60 per cent of the respondents. It is due to increased prices of chemical fertilizers, improved varieties, pesticides, *etc.* Respondents expressed lack of timely advisory services and market information (57.11 %) as the problem which might be due to the limited number of extension functionaries and more number of growers. As it is a hilly and heavy rainfall area, poor transportation and storage facilities (52.29 %) was expressed as the problem. The other problems expressed include destruction of vines by wild animals (50.87 %) and heavy rainfall and erratic weather conditions (47.46 %) were the other constraints expressed by the respondents.

## **5.7 Suggestions expressed by black pepper growers**

Majority of the respondents (80.00 %) suggested for development and supply of disease resistant varieties in time as the respondents faced huge loss of crop due to spread of wilt diseases for which the existing varieties were susceptible. Majority of the respondents (68.89 %) suggested for provision of timely advisory services and 47.78 per cent of respondents expressed suggestion for organizing awareness programs related to disease management as it accounted for economic loss. Other suggestions expressed are improvement of storage and transportation facilities in rural areas (42.22 %) and formation of FPOs (34.44 %).

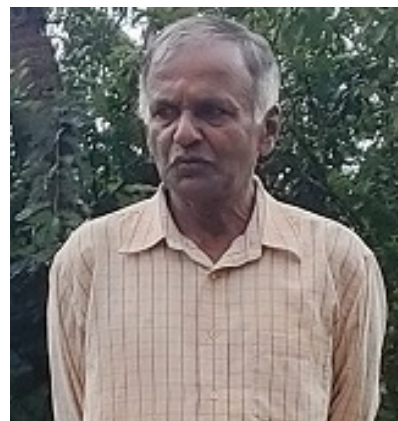
## 5.8 Success stories of black pepper growers

Name: Mr. Jeorge Mathias

Village: Jaipura

Taluk: Koppa

Introduction: A 59-year-old farmer cultivates pepper on 8 acres of land and has a diploma in agriculture. He has worked for 34 years as an assistant agricultural officer. He has been cultivating pepper for 22 years.



Farming practices followed:

The farm is focused on organic farming. Panniyur 1, 2, 3, 4, 5 and Karimunda are the cultivars grown on his farm. In the field, he avoids using chemicals because they deteriorate the soil health.

He has developed a machine for rubbing coffee and de-spiking black pepper. Therefore, labor costs can be reduced and time can be saved by avoiding the dependence on labor. He intercropped silver oak with black pepper using jungle woods as standards. He has intercropped black pepper with coffee using silver oak and jungle woods as live standards.

He grows several horticultural crops including banana, butter fruit, fashion fruit, star fruit, amla, and is also involved in growing medicinal plants, ornamental plants, as well as cardamom and vanilla on his farm. He believes that in order for plants to grow healthy, the soil should be less disturbed by man. In the view of Mr. Jeorge Mathias, black pepper is a 'god-gift' crop, requiring less inputs and investments leading to higher returns. On his farm, the average yield of black pepper is 2.5 kg per vine. The farm earns 24 lakhs annually.



Extension contact: The farmer has close contact with the Horticulture Officer and Agriculture Officer of Koppa and he gets all the required varieties and inputs to his farm.

### 5.8.2 Success story-2

Name: Mutthugowda B H

Village: Bettagere

Taluk: Mudigere

Introduction: The farmer is 63 years old and studied up until the seventh grade. He has 17 acres of land in total and has been farming since 35 years. He has been cultivating pepper for 13 years. The field has three thousand vines of black pepper which are intercropped with coffee and arecanut.



Practice: The improved methods he has incorporated into his farming include sprinkler irrigation, the use of trichoderma, fertilizer applications at the right time, and the use of COC, bordeaux mixtures, and bavistin at the right time and correct dosage. He has cultivated black pepper, coffee, arecanut in 13 acres, paddy in 5 acres and planted cardamom two years ago. The average yield of black pepper is 2 kg per vine. He gets around ₹ 28 lakh returns from his farming.



Extension contact: The farmer participates in the training programmes conducted by KVK, Mudigere and follows almost all the recommendations given by the scientists and extension personnel.

Awards: District level progressive farmer award by UAHS, Shivamogga also worked as Director of Organic farming in Uttara Kannada and Chikkamagaluru districts

### 5.8.3 Success story-3

Name: Mr. Jairaj Kadralli

Village: Jaipura

Taluk: Koppa

Introduction: The farmer is 62 years old and has a BA degree. In his 40 acres of land, he grows coffee, black pepper, arecanuts, bananas, and paddy on 20 acres. The average yield of black pepper in his farm is 2.5 kg. He owns the estate named Kadralli.



Practice: The farmer owns 60 acres of land in

total. There are twelve thousand arecanut trees and six thousand pepper vines in 40 acres coffee land. He was earning average income until he started to include pepper in his plantation. Coffee and arecanut garden was established since 40 years and used to get usual profit as cost of cultivation was in proportionate with its returns. Twenty years later, he started pepper cultivation realizing its profitability. He follows all the recommended practices and stores the produce till the prices are optimum to high. With his farm, he turns over about ₹ 1 crore per year.

Extension contact: The farmer contacts the Horticulture Officer and Agriculture Officer of Koppa.



#### 5.8.4 Success story-4

Name: Mrs. Pavithra Dinesh

Village: Joldal

Taluk: Chikkamagaluru

Introduction: Pavithra Dinesh, who is 43 years old and educated up to puc, owns 6 acres of black pepper garden.

Practice: The lady has conserved more than 25 year old black pepper vines which yields 50 kg of dry black pepper per vine. These are trailed on the old jungle woods. Coffee, arecanut, black pepper, citrus and vanilla are being



cultivated in the plantation. She has adopted sprinkler irrigation which helps in good yield and to reduce pest and disease incidence. Due to slow wilt, she had to face huge loss in yield by death of many vines. Later, as per guidance of the extension functionaries of the horticulture department, removed all the diseased vines and replanted with the healthy cuttings and taking up fertilizer and disease control measures timely. The average yield of black pepper is 2 kg per vine. She earns ₹. 25 lakhs annually from her farm.

### **5.9 Implications of the study**

- The study indicated a vast technological gap with respect to use of bio-fertilizers, pest and disease control measures, application of FYM and chemical fertilizers and value addition of pepper. Since these practices are important from the point of increasing production and profit, it warrants the attention of extension workers and scientists to intensify their advisory services in these areas and appropriate educational activities like organizing trainings, demonstrations, exhibitions, field days *etc.*, need to be undertaken to reduce the technological gap.
- The findings of the study indicated that 44.44 per cent of the pepper growers had medium level of knowledge about recommended pepper cultivation practices. The study also revealed that 57.77 per cent of pepper growers were found in medium level of technological gap category. Hence, it is imperative that the State Agricultural Universities, State Department of Horticulture, IIHR, Indian Institute of Spice Research (Calicut), and Spices Development Board should make an integrated and coordinated effort in increasing the knowledge of pepper growers and strive to reduce technological gap.
- The existing variety in the plantations of the study area is susceptible to slow wilt and quick wilt diseases. There is an urgent need for supply and popularization of the resistant varieties in the study area. Training programmes on production of biofertilizers may be carried out by the universities and State department of Horticulture and also it should be made available easily in pepper growing areas.
- Since, Karnataka is in second position for area and production of black pepper. There is a need of exclusive research and extension unit for black pepper to be established at Chikkamagaluru from Government of Karnataka.

### **5.10 Future line of study**

- The present study was limited only to three taluks of Chikkamagaluru district. Therefore, it is suggested that, further investigation may be taken up in black pepper growing districts like Kodagu, Hassan, Shivamogga, *etc.* Further, action research to demonstrate the technologies at farmers' field on a large scale may be organized to convince farmers about potential yield realizations with the existing technology itself.

- To make a meaningful generalization, there is a scope for social researchers to conduct study in the areas such as participation of men and women in black pepper cultivation practices, marketing and entrepreneurial behavior of black pepper growers.
- Scope and opportunities for value addition in pepper, advantages and limitations of growing black pepper as sole crop over multi-cropping system can be studied.



**Plate 7: Researcher during data collection with advisory committee chairperson**



**Plate 8: Researcher during data collection with the advisory committee member**

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# ***SUMMARY***

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## VI SUMMARY

Improved technologies in agriculture has widened the horizons of productivity contours of various crops. But its performance in farmers' field is not satisfactory. Due to wide variations in the agro-climatic conditions, the average yield on farm continues to be far below the potential yield. This is the cause of concern for all, those involved in the development of technology, spread of technology and also to the administrators.

India is one of the major spice producer, consumer and exporter. Among the spices, black pepper is one of the important spice crops grown in India. It is indispensable part of our culinary preparations, having potential medicinal value. In spite of all its advantages, pepper crop is being considerably neglected and in-depth research pertaining to this crop has not been done in the traditional areas. So, it was felt that, the findings with respect to technological gap in black pepper production practices by the farmers would focus light on those areas where the cultivators were found to be lacking in technical knowhow. Further, problems faced by them could be brought to the surface which would enable the policy makers and department of horticulture in planning adequate strategies to rejuvenate pepper cultivation.

Keeping the above facts in view, the present study was undertaken with the following specific objectives.

1. To study the knowledge level of Black pepper growers on cultivation practices
2. To find out the technological gap among pepper growers
3. To enlist constraints faced by pepper growers
4. To document the success stories of selected pepper growers

The study was conducted during 2020-21 in Chikkamagaluru district of Karnataka. The district was selected purposively because it had large area under pepper *i.e.* 16381.35 ha with the production of 5405.85MT. Considering maximum area under pepper cultivation as criteria, three taluks namely Chikkamagaluru, Mudigere and Koppa were selected for conducting the study. Three villages having maximum area under pepper cultivation were selected from each taluk and from each village 10 farmers growing black pepper were selected by simple random sampling procedure. Thus, sample from each taluk was 30 making a total sample size of 90 respondents.

Personal interview method was followed to collect the information in the light of objectives of the study. A schedule was developed by consulting experts and also referring to the relevant literature at the package of practices of black pepper developed by the University Horticultural Sciences, Bagalkot, IISR, Calicut and

KAU, Thrissur was considered for the study. The data collected were tabulated and analysed by using suitable statistical tools such as frequency, percentage, mean, standard deviation and Garrett ranking technique.

### **Major findings of the study**

The notable findings of the study are as follows

- Majority of the black pepper growers (44.44 %) had medium knowledge followed by high (37.78 %) knowledge level regarding black pepper cultivation practices.
- Majority (78.89 %) of the respondents had high knowledge regarding general awareness on black pepper cultivation practices.
- The chi-square statistic implies a significant association of age, education, farming experience, experience in black pepper cultivation, annual income, extension contact, information seeking behaviour, economic motivation, innovativeness and management orientation with the knowledge level of respondents regarding black pepper cultivation.
- More than half of the respondents (57.78 %) had medium technological gap followed by high (25.56 %) technological gap in adoption of recommended cultivation practices of black pepper.
- Technological gap was observed regarding cultivation of Panniyur-2 variety (27.78 %) and other improved varieties (30.00 %).
- There was no technological gap in adoption of Panniyur-1 variety, planting time, selection of planting material and time of application of fertilizers.
- High technological gap was found in case of adopting drip irrigation (54.44 %) followed by sprinkler irrigation (23.33 %).
- Significantly higher technological gap was found in use of bio-fertilizers (88.89 %).
- High technological gap was found in pest control measure for thrips (91.11 %) followed by mealy bug (83.33 %) and top shoot borer (73.33 %).
- In case of disease control measures, high technological gap was found for quick wilt (63.30 %) followed by slow wilt (46.67 %) and anthracnose (43.33 %) diseases.
- Less technological gap was observed in case of processing black pepper (16.67 %) and mechanical rubbing (05.56 %).

- Cent per cent gap was observed in drying black pepper on bamboo mat whereas very less gap was seen in drying on cement floor (04.44 %) and tarpaulin sheet (10.00 %).
- Higher technological gap was found in storage of black pepper in gunny bag (94.44 %).
- In case of marketing aspects, high technological gap was found in value addition (85.56 %) followed by hedging (72.22 %).
- The chi-square statistic implies, out of eleven variables, four variables such as land holding, experience in black pepper cultivation, cropping system, economic motivation and innovativeness were found to have significant association with the technological gap of black pepper growers.
- More than half (60.00 %) of the respondents belonged to middle age group, followed by old age group (33.33 %).
- Majority (40.00 %) of the respondents had high school education and 31.11 per cent of them had pre-university education. None of them were illiterate.
- It was observed that 35.56 per cent of the respondents belonged to semi-medium, followed by small (26.67 %) and medium (20.00 %) land holding category.
- Almost 41.11 per cent of the respondents had medium farming experience, followed by high (35.56 %) farming experience.
- Exactly half of the (50.00 %) of the respondents had medium, followed by high (26.67 %) experience in black pepper cultivation.
- Nearly half (47.78 %) of the black pepper growers belonged to medium annual income category.
- It is evident that 45.55 per cent of the respondents adopted intercropping of black pepper with coffee, followed by intercropping black pepper with coffee and arecanut.
- More than half (53.33 %) of the respondents had medium extension contact, followed by low and high extension contact of about 28.89 per cent and 17.78 per cent, respectively.
- Exactly fifty per cent of the respondents belonged to medium information seeking behaviour category followed by low (28.89 %) and high (21.11 %) level of information seeking behaviour category.
- Almost an equal number of the respondents had high (41.11 %) and medium (40.00 %) level of economic motivation.

- Majority (47.78 %) of the respondents belonged to medium innovativeness followed by low (28.89 %) level of innovativeness.
- More than half of the respondents (53.33 %) had medium level of management orientation, followed by high (30.00 %) level of management orientation.
- Majority of the black pepper growers expressed constraints such as non-availability of pest and disease resistant varieties (79.27 %), fluctuation of prices (70.44 %), increased labour wages (67.83 %), high cost of inputs (59.60 %) and lack of timely advisory services and market information (57.11 %)
- Majority of the respondents (80.00 %) suggested for supply of disease resistant varieties in time.

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## ***REFERENCES***

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## VII REFERENCES

- AHIRE, R. D. AND KAPSE, P. S., 2015, Socio-Economic Impact of Commodity Interest Group among Pomegranate Growers. AGRESO Report of Social Sciences Sub-committee, Vasant Rao Naik Marathwada Krishi Vidhyapeeth, Parbhani: 9-21.
- AGASHE, R., 2017, Knowledge and adoption level of plant protection schedule and certified seed by potato growers. *J. Krishi Vigyan*, **5**(2): 90-93.
- AJEET, K. P., MOHANTY, A. K., AND DEVARANI, L., 2015, Gap Analysis in Adoption of Scientific Mentha (*Mentha aravensis*) Cultivation in Uttar Pradesh. *Indian Res. J. Ext. Edu.* **15**(2).
- AMOGH, P. K., 2017, Economic impact of climate change and adaptation strategies in black pepper (*Piper nigrum* L.) cultivation in Kerala. *Doctoral dissertation*, Department of Agricultural Economics, Vellayani.
- ANASTASI, A., 1961, Psychological Testing. *Macmillan Company*, New York, pp. 428-436.
- ASHWANI, K. AND NARINDER, P., 2016, Study on adoption of improved blackgram practices in western Uttar Pradesh. *Int. J. Sci. Env. Tech.*, **6**:4498-4507.
- BAGYA, P. J., PREMAVATHI. AND PUTHIRA, P., 2016, Technology adoption behaviour of Jasmine growers – A critical study. *J. Extn. Edn.*, **28**(1): 5607-5613.
- BASANAYAK, R. T., KALE, S. M. AND SUNIL, C., 2014, Technological gap in adoption of recommended practices in farmers about papaya cultivation. *Agriculture Update*, **9**(2): 197-200.
- BIDVE, G. R., SASANE, G. K., WANKHADE, S. A. AND BHANGE, S. B., 2021, Socio-economic, communicational and psychological characteristics of pomegranate growers from western Maharashtra. *Age*, **54**: 15-00.
- BISWAS, M., SAHA, A., DASH, S. R. AND RAUTARAY, B. K., 2019, A study on socio demographic attributes and knowledge level of Betel vine growers on improved practices of Betel Vine cultivation in Nadia district of West Bengal. *Young*, **6**: 3-10.
- BORTHAKUR, S. P., MISHRA, R. K., TALUKDAR AND BORTAMULY, D., 2015, Scaling the adoption of recommended rice production technologies by the Farmers in Assam State. *Ind. Res. J. Ext. Edu.*, **15**(2).
- CHANDRAKANT, A., 2017, A study on multi storied cropping system in horticulture. *Ind. Res. J. Ext. Edu.*, **15**(2).

- CHANDRIKA, 2016, A study on technological gap in recommended sesame production technology among farmers of Sihora district. *J. Pharma. Photochem.*, **8**(2): 2756-2765.
- CHAUHAN, N. B. AND PATEL, R. C., 2013, Entrepreneurial uniqueness of poultry entrepreneurs. *Rural India*, **66**(12): 236-239.
- CHAVHAN, S. R., 2019, Water Resources Development of Pandeshwar Village. *J. Anal. Comput.*, pp. 1-5.
- CHEZHAN, M. G., 2011, A study on knowledge and adoption of Cardamom cultivation practices by the farmers of Chikkamagalur District. *Doctoral dissertation*, Univ. Agric. Sci., Dharwad.
- CHINMAYI, V., 2015, A comparative study on men and women self-help groups in Shivamogga district. *M.Sc. (Agri.) Thesis*, Univ. Agric. Hort. Sci., Shivamogga, Karnataka.
- DEEPIKA, K. R., 2015, Study on technological gap and adoption level of improved cultivation practices by arecanut growers of Bhadra command area. *M.Sc. (Agri.) Thesis*, Univ. Agric. Hort. Sci., Shivamogga, Karnataka.
- DHARMARAJ, 2019, A study on performance of farmer producer organizations in Shivamogga district of Karnataka. *M.Sc. (Agri.) Thesis*, Univ. Agric. Hort. Sci., Shivamogga, Karnataka.
- DIPIKA, D., AGLAWE, D. S., KOKATE, M. AND LAIRENLAKPAM, 2014, Technological gap in adoption of recommended turmeric production technology among turmeric Growers. *Guj. J. Ext. Edu.*, **25**(1): 88.
- DODIYA, V. P., 2017, Technological gap in adoption of castor seed production technology by the castor growers. *M.Sc. (Agri.) thesis*, Anand Agricultural University, Anand.
- GANESH, V., 2012, A study on technological gap in sugarcane cultivation in Kasrawad block of Khargone District, Madhya Pradesh. *M.Sc. thesis*, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior (M.P.).
- GAUTAM, 2015, Measuring farmers knowledge regarding scientific dairy practices in Haryana. *Indian Res. J. Ext. Edu.* **10**(7).
- GOHIL, G. R., JADEJA, K. AND BARAD, V. G., 2017, Knowledge of garlic growers with respect to garlic production technology. *Society of Ext. Edu.*, pp. 188.
- GUPTA, V., RAI, P. K., ABROL, P., KHAR, S. AND KUMAR, P., 2014, Diversification and Innovation in Farming System Changes the Livelihood of

- the Farmer of District Samba of Jammu Region (J&K)-A Success Story. *J. Comm. Mob. Sust. Dev.*, **9**(1): 84-88.
- GUPTA, V., RAI, P. K., ABROL, P., KUMAR, P., DWIVEDI, S. AND BADYAL, S., 2015. Strawberry Production for diversifying Agricultural Income: A Success Story from Samba district of J&K. *Agro-Economist*, **2**(1): 45-48.
- HARDIKAR, D. P., 1998, Perception of development programme and benefits derived by women beneficiaries of Ratnagiri district (Maharashtra). *Ph.D. Thesis*, Univ. Agric. Sci., Dharwad, Karnataka.
- HASSAN, S. N., 2016, A study on technological gap in banana cultivation technologies in southern district of Tamil Nadu. *Int. J. Sci. Res. Pub.*, **6**(7): 388-394.
- HINGE, R. B., 2009, Diffusion and adoption of wine grape production technology in Maharashtra. *M. Sc (Agri.) Thesis*, Univ. Agric. Sci., Dharwad.
- INGOLE, S. A., 2014, Impact of farm ponds in saline tract of Western Vidarbha. *M.Sc. (Agri.) Thesis*, Dr. Panjabrao Deshmukh Krishi Vidypeeth, Akola, Maharashtra.
- JAGANATHAN AND NAGARAJA, 2015, Perception of farmers about arecanut based multi-species cropping system. *J. Comm. Mob. Sust. Dev.*, **8**(1): 65-78.
- JAMANAL, 2107, Socio-economic characteristics of soybean growers. *J. Pharma. Photochem.*, **6**(5): 2766-2768.
- JATAPARA, A. C., SONI, N. V. AND VYAS, B. H., 2017, Constraints faced by the gram growers in adoption of improved cultivation practices of gram crop. *Guj. J. Ext. Edu.*, **28**(1): 52-54.
- KALE, N. M., 2012, Study the constraints in adoption of land care techniques for saline sodic soil of purna valley in RRC. *Indian J. Ext. Edu.*, **47**(3 & 4): 168-173.
- KARAMJIT, 2015, Analysis of adoption and constraints perceived by small paddy growers in rice production technologies in Muktsar district of Punjab State. *Int. J. Agri. Environ. Biotech.*, **5**(6): 78-93.
- KAVITHA, N. V., RAJKUMAR, N. V. AND LAKSHMI, C. S., 2014, Information seeking behaviour of dairy farmers. *Int. J. Sci. Envi. Tech.*, **3**(4): 1502-1506.
- KAVYA, M., (2018), Decision making and participation of farm men and women in paddy cultivation: A study in Shivamogga district. *M.Sc. (Agri.) Thesis*, Univ. Agri. Hort. Sci., Shivamogga.

- KHANDAVE, S., PRAJAPATI, M. R. AND PRAJAPATI, R. R., 2017, Study on technological gap and knowledge of the cotton growers. *Guj. J. Ext. Edu.*, **28**(1): 146-151.
- KHATUN, M. K., 2016, Innovativeness of Betel leaf growers to use improved practices. *Doctoral dissertation*, Sher-E-Bangla Agric. Univ., Dhaka.
- KHIRATKAR, A. G., 2009, Socio-Economic transformation due to Pan-Pimpri cultivation in Akola and Amravati district. *Doctoral dissertation*, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra.
- KIRODEE, M., 2016, Study on technological gaps and constraints faced by the guava growers in Sawai Madhopur District of Rajasthan, *Doctoral dissertation*, SKNAU, Gujarat.
- KULKARNI, N. P. AND JAHAGIRDAR, K. A., 2015, Technological gap in recommended rose cultivation practices in Dharwad district, Karnataka. *Karnataka J. Agril. Sci.*, **28**(3): 381-384.
- KUMAR, P., 2018, An analysis of adoption level and economic performance of pomegranate growers in Tumkur district of Karnataka. *Doctoral dissertation*, University of Agricultural Sciences, Bengaluru.
- KUMAR, S. K. N., 2020, A Study on farmers knowledge and adoption of production and post-harvest technology in tomato crop of Belgaum district in Karnataka. *M.Sc. (Agri.) thesis*, Dr. Rajendra Prasad Central Agric. Univ., Pusa, Bihar.
- KUMUD, G., DWIVEDI, G. K., VIKAS, K., ABHAY, K. AND TEWARI, S. K., 2016, Socio-economic characteristics of Home gardens in Bhimtal block of Nainital district, Uttarkhand. India, *Int. J. Agri. Environ. Biotech.*, **9**(6): 1001-1013.
- KULKARNI, N. P. AND JAHAGIRDAR, K.A., 2015, Technological gap in recommended rose cultivation practices in Dharwad district, Karnataka. *J. Agric. Sci.*, **28**(3): 381-384.
- LEELAVATHI, M., 2017, Impact of vocational training programme 'Friends of coconut tree and plant protection' conducted by Krishi Vigyan Kendra, Shivamogga. *M.Sc. (Agri.) Thesis*, Univ. Agri. Hort. Sci., Shivamogga, Karnataka.
- LOKHANDE, V. K., 2010, A study on adoption behavior of tomato growers in relation to improved production technology in Chindwara Block of Chhindwara District, Madhya Pradesh. *Doctoral dissertation*, JNKVV, Jabalpur.

- MADAN, M. S., SRINIVASAN, V., THANKAMANI, C. K. AND HAMZA, S., 2007, Economic Analysis of Low Input Technology for Increased Black pepper (*Piper nigrum*) Production. *Indian J. Agric. Sci.*, **77**(7): 445-447.
- MAHERIYA, H. N., PATEL, J. K. AND PATEL, R. C., 2015, Constraints experienced and suggestions offered by farmers in adoption of recommended paddy production technology. *Agriculture Update*, **10**(3): 255-258.
- MANI, M. D. AND RAJESHWARI, A., 2016, People's participation in watershed projects. *J. Ext. Res.*, **12**(1): 19-24.
- MARADDI, G. N., 2006, An analysis of sustainable cultivation practices followed by sugarcane growers in Karnataka. *Ph. D. Thesis*, Univ. Agric. Sci., Dharwad, Karnataka.
- MARKANA, J. G., 2016, Technological gap in groundnut crop in south Saurashtra agro-climatic zone of Gujarat state. *Doctoral dissertation*, JAU, Junagadh.
- MOULIK, T. K. AND RAO, C. S. S., 1973, Self rating personality scale for farmers, In; Handbook of Psychological and Social Instruments (Ed. Dareek, U. and Rao, V. T), Samashti, Baroda.
- MUTTEPPA, C., 2018, A study on knowledge and extent of adoption of improved cultivation practices by turmeric growers in Belagavi district. *Doctoral dissertation*, Univ. Agric. Sci., Bangalore, Karnataka.
- NATARAJU, B. Y., 2012, A study on participation of women in dairy farming in Chickmagalur district. *M. Sc. (Agri.) Thesis*, Univ. Agri. Sci., Bengaluru.
- NAIK, A., 2016, Knowledge and adoption of organic farming practices in red gram in dry land areas of Karnataka. *M.Sc. (Agri.) thesis*, Prof. Jayashankar Telangana State Agri. Univ., Hyderabad (India).
- NAVEEN, 2016, A study on knowledge and adoption of post-harvest technologies by turmeric growers of Bagalkot district. *M.Sc. (Agri.) thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).
- NAVEENKUMAR, 2012, Impact of National Food Security Mission - Pulse on Chickpea productivity. *Indian Res. J. Ext. Edu.* **14**(3).
- NAVYASHREE, M., 2016, A study on knowledge and adoption of improve cultivation practices of Pomegranate in Chitradurga District of Karnataka. *M.Sc. (Agri.) thesis*, Univ. Agric. and Horti. Sci., Shivamogga, Karnataka (India).
- NIDHI, S., SHEHRAWAT, P. S., ADITYA AND AMIT, K., 2019, Analysis of technological gap in adoption of recommended cultivation technologies in chickpea (*Cicer arietinum*). *J. Pharma. Photochem.*, **8**(2): 770-773.

- NISHITHA, K., 2016, Decision making and participation of farm men and women in sugarcane cultivation: A study in Mandya district. *M. Sc. (Agri.) Thesis*, Univ. Agri. Sci., Bangalore (India).
- PARASAR, S., DAS, P.K., BARMAN, I., SULTANA, S., BARMAN, S., DEKA, S.D., BARUAH, N. AND ISLAM, R., 2020. Factors influencing the extent of technological gap in adoption of scientific practices of tea cultivation by small tea growers of Assam. *Int. J. Curr. Microbiol. App. Sci*, **9**(7):1782-1789.
- PARUSHNI, 2017, A study on technology gap in ginger cultivation practices in Shivamogga district. *M. Sc. (Agri.) Thesis*, Univ. Agri. Hrt. Sci., Shivamogga, Karnataka.
- PATEL, 2014, A study on technological gap in adoption of recommended maize seed production practices by the maize seed producers. *Int. J. Agric. Sci. Res.*, **8**: 45-56.
- PATEL, 2014, A study on technological gap in adoption of sugarcane cultivation practices by sugarcane growers. *J. Pharma. Photochem.*, **8**(5): 2724-2756.
- PATEL, G. S., 2018, Impact Assessment of Vocational Training Programmes Conducted for Rural Youth by KVK, Gwalior (M.P.). *M.Sc. (Agri.) thesis*, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh.
- PATEL, V. B., PRAJAPATI, M. R. AND JOSHI, S. G., 2017, Adoption of organic farming practices by organic farmers in North Gujarat. *Guj. J. Ext. Edu.*, **28**(1): 182-184.
- PAWAR, S. K., NATIKAR, K. V. AND SUPRIYA, B. B., 2015, Knowledge level and technological gap in pepper cultivation. *Interaction*, **33**(1): 62-70.
- POORNIMA, J., 2020, Indigenous technical knowledge: a documentary study in Chikkamagaluru district. *M.Sc. (Agri.) Thesis*, Univ. Agri. Hrt. Sci., Shivamogga, Karnataka.
- PRAJAPATI, V.S., SINGH, R.R., CHOUDHARY, S.S. AND PATEL, N.B., 2017, Knowledge level of dairy farmers regarding recommended dairy management practices. *Livestock Research International*, **3**(4): 82-84.
- PRASHANTH, P., 2015, A study on adoption of organic farming in Cotton in Karimnagar district of Andhra Pradesh. *M.Sc. (Ag.) Thesis*, Acharya N G Ranga Agricultural University, Hyderabad, India.
- PUNEET, 2016, A study on adoption of dairy management practices by KVK trained farmers. *M. Sc. (Agri.) Thesis*, Univ. Agri. Hrt. Sci., Shivamogga, Karnataka.

- PYNBIANGLANG, K. H., 2011, A study on perception and adaptation of potato growers to climate change in east Khasi hills of Meghalaya, *M.Sc. (Agri.) Thesis*, Acharya N. G. Ranga Agric. Uni., Hyderabad.
- RAMACHARI, K.V., 2016, Technological gap in cultivation of vegetable pea at block Majholi district Jabalpur, MP, *Doctoral dissertation*, JNKVV, Madhya Pradesh.
- RAVINDRAN, P. N. AND JOHNY, A. K., 2000, Black pepper research under the All India Coordinated Research Project on Spices. *Indian. J. Arecanut, Spices and Medicinal Plants.*, **2**(3): 71-78.
- RAY, G. L., CHATTERGEE, P. AND BANERJEE, S. N., 1995, Technological gap and constraints in *Agric. Tech. Tran.*, Naya Prakash, Calcutta, p. 27.
- SABI, S., NATIKAR, K. V. AND PATIL, S. L., 2014, Knowledge and technological gap in adoption of recommended cultivation practices in wheat. *Kar. J. Agric. Sci.*, **27**(4): 485-488.
- SALI, J. R., MOKHALE, S. U., PADEKAR, D. G. AND RAJPUT, H. T., 2016, Adoption of Soil test recommendation by the farmers, *Asian J. Soil Science*, **11**(2): 358-360.
- SAMANTHA, R. K., 1977, Some agro-economic, socio-psychological and communication variables associated with repayment behaviour of agricultural credit users of National bank. *Ph.D. (Agri.) thesis*, Bidhan Chandra Krishi Vishwavidhyalaya, West Bengal.
- SANCLEY, D. AND MAZHAR, S. H., 2019, Socio-economic Characteristics of the Adopters and Non-adopters of Inter-cropping in Areca Nut Plantation in Ri-Bhoi District of Meghalaya. *Asian J. Agril. Ext. Econ. Socio.*, pp.1-7.
- SARYAM, M. AND JIRLI, B., 2020, Socio economic status of orange farmers in Chhindwara district of Madhya Pradesh. *Int. J. Agric. Sci. Res., IJASR*, **10**: 67-78.
- SHARMA, N., 2019, Analysis of technological gap in adoption of recommended cultivation technologies in chickpea (*Cicer arietinum*). *J. Pharma. Photochem.*, **8**(2): 770-773.
- SHARMA, P. AND BADODIYA, S. K., 2016, Impact of participation of rural women in Agricultural activities. *Indian Res. J. Ext. Edu.*, **16**(2): 12-14.
- SHELKE, P. P., INGOLE, D. N. AND DESHMUKH, K. S., 2011, Success story of adoption of Bullock drawn planter through technology transfer club. *Agri. Engr. Today.*, **35**(4): 17-19.

- SHINDE, S., 2020, Farmers' perception and adoption of groundnut production technologies in Udupi district. *M.Sc. (Agri.) thesis*, Univ. Agric. and Horti. Sci., Shivamogga, Karnataka.
- SHRUTI, G., MANDAL AND RUCHI, S., 2015, Assessing knowledge of tribal farmers regarding scientific animal husbandry practices. *Indian Res. J. Ext. Edu.* **15**(2).
- SINGH, S. K., SINGH, A. K. AND JAKHAR, K., 2017, Study on Constraints and Adoption of Black Gram Production Technology by the Farmers in Mirzapur District of Uttar Pradesh, India. *Int. J. Curr. Microbiol. App. Sci.*, **6**(10): 174-178.
- SREEKANTH, M., PEER, Q. J. A., CHOWDARYA, K. R., GANAI, B. A. AND FARHANA, 2018, A study on knowledge and adoption of Integrated Pest Management (IPM) by rice growers. *Agric. Update*, **13**(2): 178-182.
- SUBHASH, V., 2020, A study on knowledge and adoption of Betel vine (*Piper betel*) cultivation practices followed by the farmers of Davanagere district of Karnataka. *M. Sc. (Agri.) Thesis*, Univ. Agri. Hrt. Sci., Shivamogga, Karnataka.
- SUNIL AND KHARATMOL, N., 2014, Impact of trainings conducted on vermi compost by Krishi Vigyan Kendra, Bijapur. *M. Sc. (Agri.) Thesis*, Univ. Agri. Sci., Dharwad.
- SUPE, S. V. AND SINGH, S. N., 1969, Dynamics of National Behaviour of Indian Farmers. New heights publishers and distributors, New Delhi.
- SUPRIYA, D., 2016, Decision making pattern and work participation of farm women in management of coffee plantation in Kodagu district. *Doctoral dissertation*, Univ. Agric. Sci., Bangalore, Karnataka (India).
- TIGIST, P., SISYA, Y. AND KIMBRON, A., 2015, Adoption of Dairy cattle production technologies in Gondar town, North Gondar zone, Ethiopia. *Inter. J. Multid. Res.*, **5**(11): 17-19.
- TRIVEDI, G., 1963, Measurement and analysis of social-economic status of rural families. *Ph.D. thesis*, Indian Agricultural Research Institute, New Delhi.
- UIKEY, G., 2016, A study on knowledge and technological gap in adoption of recommended cultivation practices of potato in Gwalior district of Madhya Pradesh. *M. Sc. (Agri.) thesis*, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, Madhya Pradesh.

- UDAY, P., NAIN, M. S., SINGH, R., KUMAR, S. H. I. V. AND CHAHAL, V.P., 2017, Adoption of Good Agricultural Practices (GAPs) in Basmati (Scented) rice: A study of prospects and retrospect. *Indian J. Agril. Sci.*, **87**(1): 36-41.
- VENKATESWARLU, M., 1992, A Study on Technological Gap in Adoption of Improved Technology of Betel vine Production in Guntur District of Andhra Pradesh. *Doctoral dissertation*, Professor Jayashankar Telangana State Agric. Univ., Hyderabad.
- VIJAYLAKSHMI, P., 2013, A study on a critical study on technological gap in onion cultivation practices in Raichur district of Karnataka. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Raichur, (India).
- VINAYAK, N. N., 2014, A study on knowledge, adoption and economic performance of Arecanut growers in North Kanara district of Karnataka. *Doctoral dissertation*, University of Agricultural Sciences, Bangalore.
- VIVEK, M. C. AND SAHANA, S., 2021, Socio-economic Characteristics of the Farmers Following E-tendering System for Arecanut in Karnataka. *Indian Res. J. Ext. Edu.*, **21**: 2&3.
- YADAV, S., RAI, D. P. AND TRIPATHI, U. K., 2020, Technological gap in different practices of among chickpea growers in Satna district of Madhya Pradesh, India. *J. Pharma. Photochem.*, **9**(2): 1809-1813.
- YADAV, S. K., PRAJATI, R. R., PRAJAPATI, M. R. AND PATEL, V. T., 2016, Training needs and relative suitability for training programmes of tomato growers in Jaipur district of Rajasthan state. *Inter. J. Agri. Sci.*, **8**(13): 1206-1209.

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# ***APPENDIX***

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**APPENDIX**  
**Interview Schedule**  
**KELADI SHIVAPPA NAYAKA**  
**UNIVERSITY OF AGRICULTURAL AND HORTICULTURAL SCIENCES**  
**COLLEGE OF AGRICULTURE, SHIVAMOGGA**  
**DEPARTMENT OF AGRICULTURAL EXTENSION**

**“Technological gap in Black pepper cultivation practices”**

**PART- A**

Respondent No:

**I General Information**

1.	Name of the Respondent		
2.	Village :		Taluk :
3.	Contact number :		

**II Personal and socioeconomic characteristics**

1. Age : ..... years

2. Education ( Give ‘√’ mark on appropriate column )

Illiterate	Primary School	Middle School	High School	PUC/Diploma	Degree	
					UG	PG and Above

**3. Land Holding (ha)**

Sl. No	Type of land	Area (Ha)
1	Dry land	
2	Irrigated/Garden	
<b>Total</b>		

**4. Farming Experience (years)**

Sl. No	Experience in farming	
1	Experience in Black pepper cultivation	
2	Age of the crop	

**5. Annual Income**

Sl. No.	Source	Income (Rs.)
1	Income from Agriculture (other than pepper)	
2	Income from black pepper	
3	Income from allied sectors	
4	Income from non-farm activities	
	<b>Total</b>	

## 6. Cropping system

1	Black pepper + Arecanut	
2	Black pepper + Coffee	
3	Black pepper + Coffee + Arecanut	
4	Black pepper + Coffee + Arecanut + Banana + other	

## 7. Extension Contact:

Please indicate the frequency of contact with the extension personnel

Sl. No.	Source	Frequency of contact		
		Regular	Occasional	Never
1	Agriculture Officer			
2	Horticulture Officer			
3	University Scientists			
4	NGO Extension Agent			
5	Bank Extension Officer			
5	Private Agency			
6	Any other(specify)			

## 8. Information seeking behaviour

Sl.No	Information sources	Degree of contact		
		Regular	Occasional	Never
<b>A</b>	<b>Informal sources</b>			
1)	Elder family members			
2)	Friends/relatives			
3)	Progressive farmers			
4)	Neighbors			
<b>B</b>	<b>Formal sources</b>			
1)	Agril. Officers			
2)	Horticultural Officer			
3)	Scientists from UAHS, Shivamogga/ZAHRS /KVK/Mudigere			
<b>C</b>	<b>Mass media</b>			
1)	News paper			
2)	Radio			
3)	T. V			
4)	Farm magazines			
5)	Whatsapp			
6)	Other sources			

## 9. Economic motivation

Please indicate your option to the following statements

Sl. No.	Statements	A	UD	DA
1.	A farmer should work towards larger yields and economic profits from pepper cultivation			
2.	The most successful farmer is the one who makes the best profits from pepper cultivation			
3.	A farmer should try any new farming idea which may earn more money			
4.	It is difficult for farmer's children to make good start unless he provides them with economic assistance			
5.	A farmer should earn for his living, but the most important thing in life cannot be defined in economic terms			

A – Agree; UD – Undecided; DA - Disagree

## 10. Innovativeness:

Sl. No.	Statements	Response category		
		A	UD	DA
1	I try to keep myself up to date information on new farm practices, but that does not mean that I try out all the methods on my farm.			
2	I feel dissatisfaction till I try out a new farm practices I have heard about.			
3	They talk of many new practices these days, but who knows they are better than old ones.			
4	From time to time, I have heard of several new farm practices and I have tried out most applicable technologies in my farm			
5	I usually wait to see what results my neighbours obtained before I try out new farm practices.			
6	Somehow I believe that traditional ways of farming is the best.			
7	I am cautious about trying a new practice.			
8	Often new practices are not successful. However, if they are promising I would surely like to adopt them.			
9	I deserve to adopt practices which gives best results			

A – Agree; UD – Undecided; DA - Disagree

## 11. Management Orientation

Please indicate your option to the following statements

Sl. No.	Statements	A	UD	DA
1.	One should think of diversification of crops and not depend on only pepper.			
2.	It is not necessary to think about the cost involved in pepper cultivation			
3.	Determining fertilizer dose by soil testing saves money			
4.	For timely harvest one should analyze the maturity of crop			
5.	Farmers should know different forms of produce and its prices in the market			
6.	One should sell his produce to the nearest market irrespective of price			

A – Agree; UD – Undecided; DA - Disagree

### PART – B

#### I KNOWLEDGE ABOUT PEPPER CULTIVATION PRACTICES

<b>Q. 1</b>	<b>Which of the following is known as “King of spices”?</b>	
	a) Clove	b)Cinnamon
	c) Cardamom	d) Black pepper
<b>Q. 2</b>	<b>Which of the following states has the largest share of black pepper production in India</b>	
	a) Karnataka	b) Kerala
	c) Tamil Nadu	d) Andra Pradesh
<b>Q.3</b>	<b>Which of the following black pepper variety is most cultivated in Chikkamagaluru region?</b>	
	a) Malligesara	b) Panniyur
	c) Karimunda	d) Doddiga
<b>Q. 4</b>	<b>Best time for transplanting black pepper seedlings in malnad region is:-</b>	
	a)December-January	b)March-April
	c) July-August	d) October-November
<b>Q. 5</b>	<b>Which of the following is the best propagation method for black pepper</b>	
	a) Pit method	b) Serpentine method
	c) Micro propagation	d) Vegetative propagation
<b>Q. 6</b>	<b>Most suitable soil for cultivation of black pepper is</b>	
	a) Black soil	b) Red soil
	c) Red sandy loam soil	d) Laterite soil

<b>Q. 7</b>	<b>Preferable age of mother vine suitable for cuttings of black pepper</b>	
	a) 1-2 years	b) 3-5 years
	c) 5-12 years	d) 13-16 years
<b>Q. 8</b>	<b>Recommended direction of planting in black pepper</b>	
	a) Western slope	b) South West
	c) Eastern slopes	d) Northern slopes
<b>Q. 9</b>	<b>Optimum duration for transplanting from the germination</b>	
	a) within 25 days	b) 25 to 45 days
	c) 46 to 60 days	d) after 60 days
<b>Q. 10</b>	<b>Which of the following is the major disease in nursery of black pepper</b>	
	a) Wilt	b) Phytophthora rot
	c) Anthracnose	d) Die back
<b>Q. 11</b>	<b>Time required for first bearing in black pepper</b>	
	a) 2-3 years	b) 3-5 years
	c) 5-6 years	d) 7-8 years
<b>Q. 12</b>	<b>The recommended dose of NPK per vine black pepper is</b>	
	a) 50:50:50 gm	b) 100:120:160 gm
	c) 100:40:140 gm	d) 25:50:150 gm
<b>Q. 13</b>	<b>Which of the nutrient is deficient in Chikkamagaluru soils</b>	
	a) Boron	b) Zinc
	c) Nitrogen	d) Magnesium
<b>Q. 14</b>	<b>Recommended dose of Lime to be applied per vine in black pepper is</b>	
	a) 250 g	b) 500 g
	c) 750 g	d) 1 kg
<b>Q. 15</b>	<b>Which of the following is the major disease in black pepper garden</b>	
	a) Anthracnose	b) Slow wilt
	c) Quick wilt	d) Leaf rot
<b>Q. 16</b>	<b>Suitable control method for quick wilt in black pepper is</b>	
	a) Carbendazim @ 1 g/l	b) Mancozeb (0.25%)
	c) Metalaxyl (0.25%)	d) Bordeaux mixture
<b>Q. 17</b>	<b>Which of the following is the suitable control method for slow wilt in Black pepper?</b>	
	a) Metalaxyl (0.25%)	b) Neem cake @ 1kg/vine
	c) Carbendazim @ 0.1%	d) All the above
<b>Q. 18</b>	<b>Which of the following is considered as the serious pest of black pepper in Chikkamagalur?</b>	
	a) Pollu beetle	b) Top shoot borer
	c) Leaf gall thrips	d) Mealy bugs

<b>Q. 19</b>	<b>Indicate on which basis you are grading the produce before market of black pepper</b>	
	a) Size and Shape	b) Wrinkleness
	c) Both a & b	d) Do not grade
<b>Q. 20</b>	<b>Which of the following is the adulterant of black pepper?</b>	
	a) Pebbles	b) Papaya seeds
	c) Chaff	d) Other extraneous organic matter

## II. Technological gap in adoption of recommended cultivation practices of Black Pepper

Sl. No.	Recommended practices	Adoption level	
		Adopted	Not Adopted
<b>1</b>	<b>Varieties</b>		
a.	Panniyur-1		
b.	Panniyur-2		
c.	Other improved varieties		
<b>2.</b>	<b>Planting time</b>		
a.	May-June		
<b>3.</b>	<b>Planting Material</b>		
a.	Runner with 4 eye buds		
b.	Poly bag plant		
<b>4.</b>	<b>Spacing</b>		
i.	In Coffee Garden (8m*8m)		
ii.	In Areca nut Garden (2.7m*2.7m)		
<b>5.</b>	<b>Size of the pits for planting pepper</b>		
a.	45 cm *45 cm *45 cm		
<b>6.</b>	<b>Plant population/ha</b>		
i.	Coffee Garden:156 plants/ha		
ii.	Areca nut Garden :1370 plants /ha		
<b>7.</b>	<b>Irrigation methods</b>		
i.	Drip irrigation		
ii.	Sprinkler irrigation		
<b>8.</b>	<b>Filling materials used in the pits</b>		
	3 part surface Soil+2 part FYM+ 1 part Sand+2%Trichoderma (in polythene bags )		

<b>9.</b>	<b>FYM (10 Kg per vine)</b>		
<b>10.A</b>	<b>Application of fertilizers (per vine)</b>		
a.	Dosage (100:40:140 g)		
b.	Time of application (May-June, August-September)		
<b>10.B</b>	<b>Bio fertilizer application per vine</b>		
	50g Azospirillum + 50g PSB		
<b>11. Measures to control the major pests</b>			
<b>Sl.No</b>	<b>Name of pest</b>	<b>Chemicals/Bio agents used for control</b>	<b>A</b>
a.	Mealy bugs	Chlorantriliprole 18.5 EC @ 0.5 ml/l	
b.	Thrips	Diamethoate 30 EC @ 1.7 ml/l Quinalphos 25 EC @ 2 ml/l Methyl Parathion 50 EC @ 1 ml/l	
c.	Top shoot borer	Chlorpyriphos 20 EC @ 1.5-2.5 ml/l Monocrotophos 36 EC @ 0.5 ml/l	
<b>12. Measures to control the major disease</b>			
a.	Slow wilt	Neem cake application + Phorate 10 G	
b.	Quick wilt	Soil application of FYM+Trichoderma and spray of Bordeaux mixture followed by need based spray of metalaxyl	
c.	Anthracnose	Spray CoC @ 0.3% Antracol @ 0.2% Propiconazole @ 0.1%	
<b>13.</b>	<b>Yield obtained per vine</b>		
a.	Less than 10 year vine (1.5 kg)		
b.	More than 10 year vine (2 kg)		
<b>14.</b>	<b>Harvesting and processing of Black Pepper</b>		
i.	When the colour of one or two berries on the spike turn red, the whole spike should be plucked		
ii.	Later the berries should be dipped in boiling water for a minute to get good colour.		
iii.	After that berries should be sun dried for 3-5 days		
<b>15.</b>	<b>Methods followed for pepper de-spiking</b>		
a.	Mechanical rubbing		
b.	Manual rubbing		

<b>16.</b>	<b>Drying methods</b>	
a.	Sundry on cement floor	
b.	Sundry on bamboo mat	
c.	Sundry on tarpaulin sheet	
<b>17.</b>	<b>Packing and storage</b>	
a.	Jute gunny bag with polythene lining	
b.	Polythene bags	
<b>18.</b>	<b>Marketing</b>	
a.	Value addition (White pepper)	
b.	Short channel	
c.	Hedging	
d.	Local trader	

### III. Constraints expressed by the respondents

Sl. No.	Constraints	Rank
1	Non-availability of disease resistant varieties	
2	Fluctuation of prices or lower prices	
3	Labor wages	
4	High cost of inputs	
5	Lack of timely advisory services and market information	
6	Destruction of vines by wild animals	
7	Poor transportation and storage facilities	
8	Heavy rainfall and erratic weather conditions	

### IV. Suggestions to overcome the Constraints

Sl. No	Suggestions
1	
2	
3	
4	
5	