A STUDY ON KNOWLEDGE AND PERCEPTION OF AROMATIC BLACK RICE GROWERS TOWARDS MISSION ORGANIC VALUE CHAIN DEVELOPMENT SCHEME IN MANIPUR

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PALB 8030

DEPARTMENT OF AGRICULTURAL EXTENSION

UNIVERSITY OF AGRICULTURAL SCIENCES

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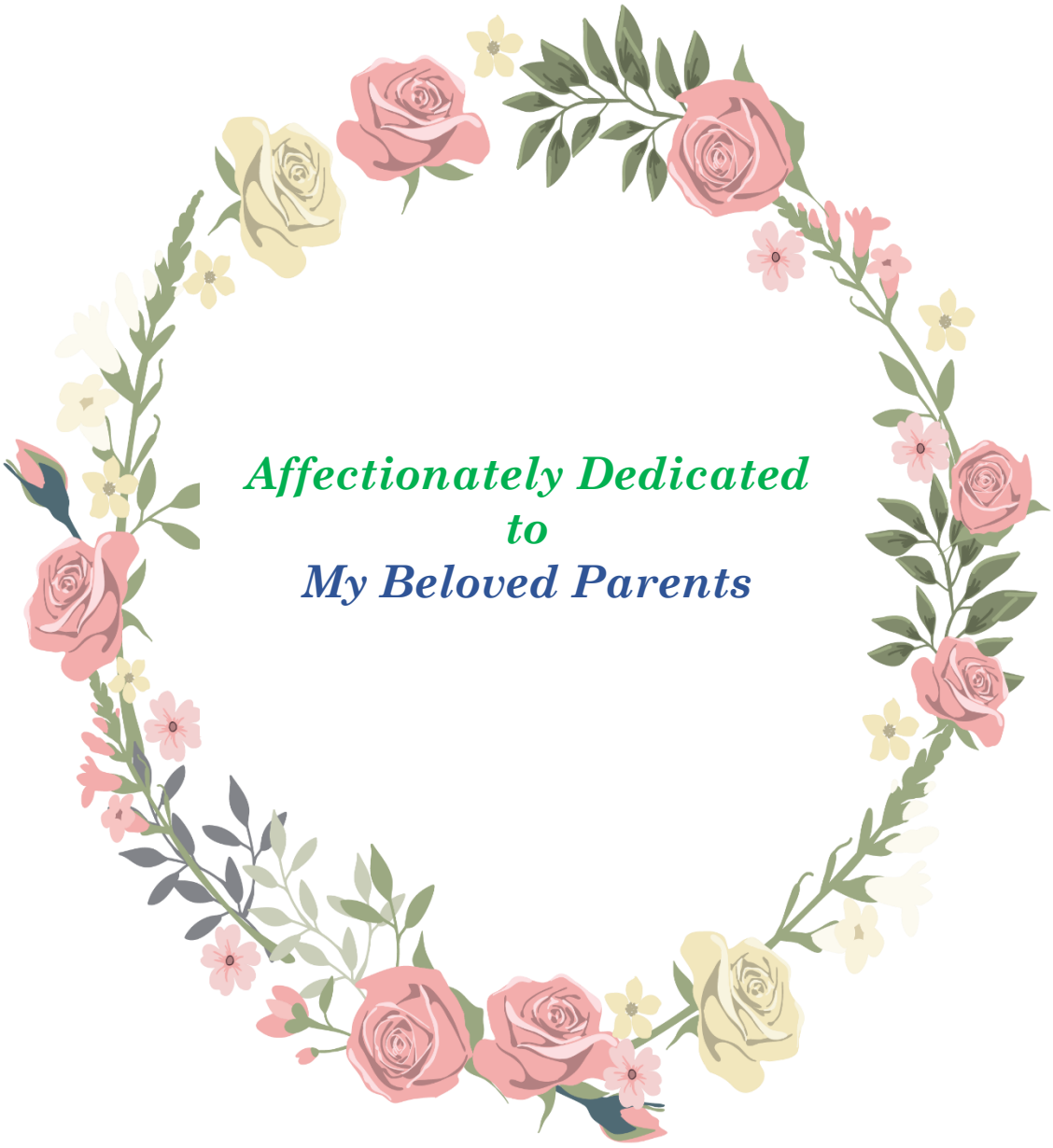
Affectionately Dedicated
to
My Beloved Parents

DEPARTMENT OF AGRICULTURAL EXTENSION
UNIVERSITY OF AGRICULTURAL SCIENCES
BANGALORE

CERTIFICATE

This is to certify that the thesis entitled **"A STUDY ON KNOWLEDGE AND PERCEPTION OF AROMATIC BLACK RICE GROWERS TOWARDS MISSION ORGANIC VALUE CHAIN DEVELOPMENT SCHEME IN MANIPUR"** submitted by **Mr. MEGHAJIT SHARMA SHIJAGURUMAYUM, ID No. PALB 8030** for the award of degree of **DOCTOR OF PHILOSOPHY in AGRICULTURAL EXTENSION** to the University of Agricultural Sciences, Bangalore, is a record of *bonafide* research work done by him during the period of his study in this University, under my guidance and supervision. This thesis has not previously formed basis for award of any degree, diploma, associateship, fellowship or other similar titles.

Bengaluru
February, 2022

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MEGHAJIT SHARMA SHIJAGURUMAYUM

ABSTRACT

The present research study was conducted in Bishnupur and Thoubal districts of Manipur to analyze the knowledge and perception of aromatic black rice growers towards Mission Organic Value Chain Development Scheme. One hundred and eighty aromatic black rice growers were interviewed using a pre-tested interview schedule. The results revealed that a greater proportion of the aromatic black rice growers (44.55%) had better perception, whereas more than one-third (37.22%) and less than one-fifth (18.33%) of them had good and poor perception towards Mission Organic Value Chain Development Scheme, respectively. Over 85.00 per cent of the aromatic black rice growers had correct knowledge on the benefits provided under Mission Organic Value Chain Development Scheme. Education, organic farming experience, livestock possession, crop productivity, achievement motivation, aspiration, management orientation, economic motivation, risk orientation, innovative proneness, mass media exposure, training on organic farming, extension agency contacts and extension participation of aromatic black rice growers had a significant association with the knowledge and perception towards Mission Organic Value Chain Development Scheme. Scarcity of organic manure, inadequate financial assistance provided for off-farm inputs (biofertilizers, biopesticides and neem cake), lack of credit facilities to invest on organic agriculture and allied activities, inaccessible to organic produce outlets, lack of access to reliable market information and irregular collection of organic produces from farmgate were the major problems faced by the respondents in Mission Organic Value Chain Development Scheme.

February, 2022

Department of Agricultural Extension,
University of Agricultural Sciences,
GKVK, Bangalore

(**M. T. LAKSHMINARAYAN**)
Major Advisor

ಮಣಿಪುರದ ಮಿಷನ್ ಸಾವಯವ ಮೌಲ್ಯ ಸರಪಳಿ ಅಭಿವೃದ್ಧಿ ಯೋಜನೆಯ ಬಗ್ಗೆ ಸುವಾಸನೆಯುಕ್ತ ಕಪ್ಪು ಭತ್ತದ ಬೆಳೆಗಾರರ ಜ್ಞಾನ ಮತ್ತು ಗ್ರಹಿಕೆಗಳ ಒಂದು ಅಧ್ಯಯನ

ಮೇಘಜಿತ್ ಶರ್ಮ ಶಿಜಗುರುಮಯುಂ

ಸಾರಾಂಶ

ಪ್ರಸ್ತುತ ಸಂಶೋಧನಾ ಅಧ್ಯಯನವನ್ನು ಮಣಿಪುರದ ಬಿಷ್ಣುಪುರ ಮತ್ತು ತೌಬಲ್ ಜಿಲ್ಲೆಗಳಲ್ಲಿ ನಡೆಸಲಾಯಿತು. ಮಣಿಪುರದ ಸುವಾಸನೆಯುಕ್ತ ಕಪ್ಪು ಭತ್ತದ ಬೆಳೆಗಾರರ ಜ್ಞಾನ ಮತ್ತು ಗ್ರಹಿಕೆಗಳನ್ನು ಮಿಷನ್ ಸಾವಯವ ಮೌಲ್ಯದ ಕಡೆಗೆ ವಿಶ್ಲೇಷಿಸಿ ಸರಪಳಿ ಅಭಿವೃದ್ಧಿ ಯೋಜನೆ ಪೂರ್ವ–ಪರೀಕ್ಷಿತ ಸಂದರ್ಶನ ತಪಸೀಲನ್ನು ಬಳಸಿ, ನೂರ ಎಂಭತ್ತು ಸುವಾಸನೆಯುಕ್ತ ಕಪ್ಪು ಭತ್ತದ ಬೆಳೆಗಾರರನ್ನು ಸಂದರ್ಶಿಸಲಾಯಿತು. ಅತಿ ಹೆಚ್ಚಿನ ಸುವಾಸನೆಯುಕ್ತ ಕಪ್ಪು ಭತ್ತದ ಬೆಳೆಗಾರರು (44.45%) ಅತ್ಯುತ್ತಮ ಗ್ರಹಿಕೆ ಹೊಂದಿದ್ದರೆ, ಮೂರನೇ ಒಂದು ಭಾಗದಷ್ಟು (37.22%) ಮತ್ತು ಐದನೇ ಒಂದು ಭಾಗಕ್ಕಿಂತ ಕಡಿಮೆ (18.33%) ಮಿಷನ್ ಸಾವಯವ ಮೌಲ್ಯ ಸರಪಳಿ ಅಭಿವೃದ್ಧಿ ಯೋಜನೆಯ ಬಗ್ಗೆ ಕ್ರಮವಾಗಿ ಉತ್ತಮ ಮತ್ತು ಕಳಪೆ ಗ್ರಹಿಕೆ ಹೊಂದಿದ್ದಾರೆಂದು ತಿಳಿದು ಬಂದಿದೆ. ಸುವಾಸೆಯುಕ್ತ ಕಪ್ಪು ಭತ್ತದ ಬೆಳೆಗಾರರಲ್ಲಿ ಶೇಕಡಾ 85.00 ಕ್ಕಿಂತ ಹೆಚ್ಚು ಜನರು ಮಿಷನ್ ಸಾವಯವ ಮೌಲ್ಯ ಸರಪಳಿ ಅಭಿವೃದ್ಧಿ ಯೋಜನೆಯಡಿ ಒದಗಿಸಲಾದ ಪ್ರಯೋಜನಗಳ ಬಗ್ಗೆ ಸರಿಯಾದ ಜ್ಞಾನವನ್ನು ಹೊಂದಿದ್ದಾರೆ. ಶಿಕ್ಷಣ, ಸಾವಯವ ಕೃಷಿ ಅನುಭವ, ಜಾನುವಾರುಗಳ ಸ್ವಾಧೀನ, ಬೆಳೆ ಉತ್ಪಾದಕತೆ, ಸಾಧನೆಯ ಪ್ರೇರಣೆ, ಆಕಾಂಕ್ಷೆ, ನಿರ್ವಹಣಾ ದೃಷ್ಟಿಕೋನ, ಆರ್ಥಿಕ ಪ್ರೇರಣೆ, ಅಪಾಯದ ದೃಷಿಕೋನ, ನವೀನ ಸ್ಪಷ್ಟತೆ, ಸಮೂಹ ಮಾಧ್ಯಮ ವಿಭಾಗ, ಸಾವಯವ ಕೃಷಿಯ ತರಬೇತಿ, ವಿಸ್ತರಣಾ ವಿಭಾಗಗಳ ಸಂಪರ್ಕ ಮತ್ತು ವಿಸ್ತರಣೆಯ ಚಟುವಟಿಕೆಗಳ ಭಾಗವಹಿಸುವಿಕೆಯು ಸುವಾಸನೆಯುಕ್ತ ಕಪ್ಪು ಭತ್ತದ ಬೆಳೆಗಾರರ ಜ್ಞಾನದೊಂದಿಗೆ ಮತ್ತು ಮಿಷನ್ ಸಾವಯವ ಮೌಲ್ಯ ಸರಪಳಿ ಅಭಿವೃದ್ಧಿ ಯೋಜನೆಯ ಕಡೆಗೆ ಗ್ರಹಿಕೆ ಮಹತ್ವದ ಸಂಬಂಧವನ್ನು ಹೊಂದಿದೆ. ಸಾವಯವ ಗೊಬ್ಬರ ಕೊರತೆ, ಕೃಷಿ ಪರಿಕರಗಳ ಕೊಳ್ಳಲು ಅಸಮರ್ಪಕ ಹಣಕಾಸಿನ ನೆರವು (ಜೈವಿಕ ಗೊಬ್ಬರ, ಜೈವಿಕ ಕೀಟನಾಶಕ ಮತ್ತು ಬೇವಿನ ಹಿಂಡಿ), ಸಾವಯವದಲ್ಲಿ ಕೃಷಿ ಮತ್ತು ಸಂಬಂಧಿತ ಚಟುವಟಿಕೆಗಳಲ್ಲಿ ಹೂಡಿಕೆ ಮಾಡಲು ಸಾಲ ಸೌಲಭ್ಯಗಳ ಕೊರತೆ, ಕಡಿಮೆ ಲಭ್ಯವಿರುವ ಸಾವಯವ ಉತ್ಪನ್ನಗಳ ಮಳಿಗೆಗಳು, ವಿಶ್ವಾಸಾರ್ಹ ಮಾರುಕಟ್ಟೆಗಳ ಬಗ್ಗೆ ಮಾಹಿತಿ ಮತ್ತು ರೈತರ ತಾಕುಗಳಿಂದ ಸಾವಯವ ಉತ್ಪನ್ನಗಳ ಅನಿಯಮಿತ ಸಂಗ್ರಹಣೆಯಂತಹ ಪ್ರಮುಖ ಸಮಸ್ಯೆಗಳನ್ನು ಮಿಷನ್ ಸಾವಯವ ಮೌಲ್ಯ ಸರಪಳಿ ಅಭಿವೃದ್ಧಿ ಯೋಜನೆಯಲ್ಲಿ ರೈತರು ಎದುರಿಸುತ್ತಿದ್ದಾರೆ.

ಫೆಬ್ರವರಿ 2022,

ಕೃಷಿ ವಿಸ್ತರಣಾ ವಿಭಾಗ
ಕೃಷಿ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ, ಬೆಂಗಳೂರು

(ಎಂ. ಟಿ. ಲಕ್ಷ್ಮೀನಾರಾಯಣ್)
ಮುಖ್ಯ ಸಲಹೆಗಾರರು

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I INTRODUCTION

According to the current United Nation's projections, the world population could witness a possible increment of two billion people from today's level, projected to reach an estimate of 9.15 billion by 2050. The increase in the population is inevitable, something which can be managed, but not be stopped. Furthermore, the foreseeable increase in the demography comes with consequences and threats. It imposes questions, if the world is well equipped with the production of food grains to meet the demands of the rising population. As per the estimates given by Food and Agriculture Organisation, the increase in population would mean more requirement of production of food to sustain the food security of the ever-growing population. Demand for cereals is projected to reach some 3 billion tonnes by 2050, up from about 2.1 billion today. This means that feeding an estimated world population of 9.1 billion people in 2050 would emphasize an increase of 70 per cent of food over the period from 2005 to 2050 (Anon, 2009).

These factual translate to an unprecedented pressure on agriculture, the need to amplify and intensify the current rate of production indicating a call for a second wave of Green Revolution. Though what is ought to be remembered is that agriculture despite its novelty tempers with nature and ecosystem, with the technological advancement in artificial genotypes and varieties of crops are being introduced and newer more effective chemicals in the name of agricultural inputs are being rolled out. The unjudicial and intense use of these chemicals for the sake of increasing the production could impose serious threats to the ecosystem and inflict negative implications on the very sustainability of the agro-ecosystem.

As witnessed before, the past initiatives in the 1960s, such as the green revolution which plummeted the country's agricultural production by multiple folds transfiguring India from a food deficit to a food grain surplus country through intensification of the agricultural production came with a cost. The advancement in agricultural technologies has pushed for intensive and higher production, which in turn has negative effects *viz.,* loss of soil fertility, erosion of soil, soil toxicity, diminishing water resources, pollution of underground water, salinity of underground water, increased incidence of livestock and

human diseases and global warming have resulted out of over adoption of agricultural technologies (Rehman, 2015).

In the Indian context, with a greater part of the land being ruined, the country has very little expectation of sustenance. The biggest provoke will be to produce more food for the people with limited land coupled with higher demand of water and other inputs to feed the hunger. Further, the rapid degradation of the environment due to the pressure put upon the natural system of production places a question as to how long the environment would be able to sustain the temperament. To counter the degradation, adoption of more sustainable approaches to food production are of utmost importance and organic agriculture is such sustainable approach to the food production, which in dissimilarity to the conventional agriculture relies solely on organic based inputs and the natural production potentiality of the environment.

The term 'organic agriculture' has been defined in many ways differently by various researchers. To majority, it points to '*the application of organic manures coupled with indigenous plant protection methods in lieu of inorganic fertilizers and pesticides.* For instance, the International Federation for Organic Agriculture Movement (IFOAM) in their general assembly held in 2008 has defined the word organic agriculture. According to IFOAM *'organic agriculture is the production system which sustains the health of soils, ecosystems, and people relying on ecological processes, biodiversity and cycles adopted to local conditions, rather than the use of chemical inputs with adverse effects. It combines the tradition, innovation, and science to benefit the shared environment and promote fair relationships for improving the quality of life for all concerned'* (Anonymous, 2008).

Food and Agriculture Organisation (FAO) has defined organic agriculture as a *'holistic production management system mainly promoting and enhancing agro-ecosystem health, biological cycles biodiversity and soil biological activity'*(Anonymous, 1999). It emphasises the use of agri-management practices largely using externally sourced synthetic fertilizers, considering regional conditions requiring for locally adapted systems. This could be accomplished by adopting, wherever possible, agronomic, biological, and

mechanical measures, as opposed to using inorganic materials (agro-chemicals etc.), to fulfil the specific function within the eco- system.

What can be synthesised from the above cited definitions is that organic agriculture is the type of agriculture that relies on organic based inputs and methods which harmonises the production while enhancing the already exiting production capabilities of the environment and not by exploiting the natural production potentiality of the environment. Organic agriculture is mainly based on management strategies that restores, maintains and sustains ecological harmony which not only acts as an all-inclusive approach of production system that provides *organic quality food*, and restoring the land fertility on long term basis thereby answering to the question of a sustainable production environment.

Application of organic manure (farm yard manure, compost, green manure, oil cake, biofertilizer etc.) improves the physical conditions of the soil, increases microbial activity, facilitates slow release of nutrients, reduces nutrient losses, helps to build up soil fertility, and sustains high uptake of both major and minor nutrients. Consistently in obtaining higher yield per unit area in respect of rice based cropping system realised in countries like China is mainly due to the regular use of organic manures or crop residue which supply over half of the crop nutrient requirement. The cost of agro-chemicals (fertilizer and plant protection chemicals) are becoming costlier year after year and for most of the rice farmers who are resource poor with the less land holding and it is uneconomical to depend only on agro-chemicals. Hence, resource poor farmers need to adopt organic manures and adopt physical, cultural and biological control of pests and diseases in rice production (Muthuraman, 1995).

Tracing back to the pre-colonial era Indian agriculture had always been rooted with organic agriculture. The agricultural scenario shifted in the 1960s with the arrival of green revolution. But currently efforts are being made to shift back to the olden ways of organic agriculture regardless of the increasing food demands, ensuring the sustainability needs of the nation. The recent importance for organic agriculture is focused in certain pockets of the country with special emphasis in the North-Eastern states owing to the potential this region has in terms of excelling in organic agriculture.

Organic potentiality of North-East region of India

The natural environment of the North-East Region is rich in biodiversity, both in forest and in agriculture. The microclimatic conditions influenced by altitude, degree of slope, soil condition, rainfall pattern etc., are mainly responsible for the rich biodiversity of the area. The variety of cereals, millets, spices, pulses, vegetables, fruits, medicinal plants and herbs, dye and aromatic plants as well as nuts and flower species places the North-East Region in a special category. But this rich biodiversity potential has not been adequately or judiciously harnessed for enhancing and sustaining livelihood opportunities for the local communities.

The north-eastern region of India provides considerable scope and opportunity for organic farming due to least utilization of chemical inputs, availability of conducive agro-ecological for organic farming, soil rich in organic matter (>1 %), high farm level agricultural diversity and above all the North-Eastern region are traditionally following low external input driven agriculture. It is estimated that 18 million hectares of such land is available in the North-East, which can be exploited for organic production.

Even with the environmental factors well suited for organic agriculture what is ought to be remembered is, are the farmers of the North-Eastern region are actually ready to take up organic agriculture. As pointed out by various research finding transitioning from conventional to organic farming comes with more risk, high initial cost, lengthy procedures, time and stringent qualitative evaluation, which many a times farmers are reluctant to go through. Furthermore, unlike major agricultural states like Karnataka and Punjab, most of the farmers in the north eastern region of the country are not commercially oriented due to smaller landholding which make the risk bearing ability of the famers questionable. The results of research studies have revealed that provisions of subsidies has always been positively associated with farmer's decision to convert to organic farming. One such scheme which promotes organic agriculture coupled with provision of subsidies in the north east region is the Mission Organic Value Chain Development Scheme in North East Region (MOVCD-NER).

Mission Organic Value Chain Development Scheme

The Mission Organic Value Chain Development for North Eastern Region (MOVCD-NER) is a Centrally Sponsored Scheme established by the Ministry of Agriculture and Farmers Welfare. This is a sub-mission scheme under the National Mission for Sustainable Agriculture (NMSA). It is implemented for promoting organic cultivation practices among farmers and values chain creation in the North Eastern States. Phase I was planned to be implemented from 2015-16 to 2017-18, however the project implementation got delayed by two years and it was started from 2017-18 to 2019-2020 covering 2000 ha. The project authorities are planning to implement phase II of the project from 2021-22 covering 50,000 ha.

The Mission Organic Value Chain Development Scheme (MOVCDS) is implemented by Manipur Organic Mission Agency (MOMA) in Manipur aiming at promotion and production of certified organic commodities focussing on export-oriented crops viz., Black Aromatic Rice, Ginger, Tamenglong Orange, King Chilli, Kachai Lemon and Pineapple. The MOMA is conducting various production and extension activities, such as providing training on organic cultivation and identification of farmer cluster groups through which the organic practices, the information and technical know-how are expected to be trickled down.

Aromatic black rice

The black aromatic black rice is a native to the north-eastern region of India. The black colour of the grain which give the crop a distinct feature is primarily due to its anthocyanin content. The crop is usually grown in the kharif season during the months of May and June and is harvested in the months of September and October. Moreover, the duration of the crop is 120 days meaning that its duration is a fortnight longer than the normal white rice. Morphologically black rice is deeper green in colour and even attains a height of 4-4.5 feet. Various studies have reported that the aromatic black rice have superior nutritional values such as higher contents of minerals, proteins, high antioxidants, and perceived to have various health benefits.

The black aromatic rice crop has been gaining importance during the recent years in the local, national and international markets by all the categories of farmers (Reddy, 2018). Black aromatic black rice is considered as one of the healthiest rice varieties with higher vitamins and minerals content, than the white and brown rice. The crop has received the status of Geographical Indicator of Manipur. The black aromatic black rice has a huge market demand and the rice could be used to prepare a good number of value-added products. Even though that the crop yield when grown organically yield lower i.e., about 12-15 q/acre the trivial feature of the crop aligns with the major drivers of organic market bloom, which include rising disposable incomes, increasing population, rising health consciousness, and consumer spending on health and wellness products making it a popular crop in local, national and even international market.

Statement of problem

Though despite the efforts made by MOVCDS in promoting organic cultivation of aromatic black rice, what is needed to be looked upon is the fact that aromatic black rice in- spite of its superior nutritional benefits, the crop has not been commercialised to the extent which it needs to be. Owing to the reason that farmers perceived cultivating white rice to be more economically rewarding. Traditionally in Manipur, aromatic black rice is often cultivated and grown in smaller areas or plots. Moreover, organic cultivation has often been criticised on the grounds of lower productivity as compared to the conventional cultivation methods. The present research study is planned to know the effectiveness of the scheme in persuading farmers in cultivating a seemingly minor crop on a larger scale coupled with an organic approach.

With this background, the present research investigation was taken up with the following specific objectives.

1. To develop and standardize a scale to analyse the perception of aromatic black rice growers towards MOVCDS

2. To study the perception of aromatic black rice growers towards MOVCDS

3. To assess the knowledge level of aromatic black rice growers regarding the benefits provided under MOVCDS
4. To study the extent of adoption of organic farming practices by the aromatic black rice growers
5. To find out the association, extent of contribution and direct, indirect and largest direct effects of profile characteristics of aromatic black rice growers on the perception, knowledge and adoption level
6. To document the case studies of successful aromatic black rice growers
7. To document the problems faced by the aromatic black rice growers in MOVCDS

Hypotheses of the study

The below mentioned hypotheses were developed in relation to the objectives set forth for the research study.

1. H_0 (1): There is no difference in the perception level among the aromatic black rice growers towards MOVCDS
2. H_0 (2): There is no difference in the knowledge level among the aromatic black rice growers regarding the benefits provided under MOVCDS
3. H_0 (3): There is no difference in the adoption level of organic farming practices followed by aromatic black rice growers
4. H_0 (4): There is no association between the profile characteristics of aromatic black rice growers with the perception towards MOVCDS
5. H_0 (5): There is no association between the profile characteristics of aromatic black rice growers with the knowledge level regarding the benefits provided under MOVCDS
6. H_0 (6): There is no association between the profile characteristics of aromatic black rice growers with the adoption of organic farming practices

Scope and importance of the study

Standardized scale to measure the perception of aromatic black rice growers towards MOVCDS will be developed as a part of the study, and the developed scale will be used to analyse the perception of aromatic black rice growers towards MOVCDS. The research would also assess the knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS. Further, it will analyse the adoption level of organic farming technologies practiced by the aromatic black rice growers.

The study also aims in understanding the association and find out the contribution of profile characteristics of aromatic black rice growers on their knowledge, perception and adoption level. Further, the study will throw light in documenting the problems encountered by the beneficiaries in the MOVCDS.

Limitations of the study

The present study is conducted by a student researcher who had limited time and other resources at his disposal. The study was restricted to two districts (Thoubal and Bishnupur) of Manipur. Hence, any policy framed based on the results of the study may not confirm to policy specification needs in general to other areas/parts of the country. However, there was limitations of the study in respect of time, finance, mobility and physical facilities. In spite of these limitations, all the efforts were made by the researcher to conduct the study as objectively as possible by following all the norms of the scientific research in a systematic way.

Organization and presentation of study

The dissertation is systematically depicted in six chapters. First chapter deals with the ‘Introduction’, where in problem statement, objectives, hypothesis, scope of the study and limitations of the study is discussed. The second chapter highlights the ‘Review of Literature’ related to the research investigation. Chapter three deals with the ‘Methodology’ used in the process of investigation and quantification procedures followed in conducting the study. Chapter four encompasses the ‘Results and Discussion’ of the research data and the fifth chapter ‘summary’ summarizes the investigation, followed by sixth chapter enlisting the references used for the study.

II REVIEW OF LITERATURE

Past studies pave way for future research endeavours. An in-depth review of the past studies warrants a strong foundation for the current research endeavours for the review of literature on the topic under investigation would provide a deep insight into the subject which is inevitable for rigorously performing the research study. Review of literature helps to acquire broad and general background in the given field of discipline. An acquaintance with earlier pertinent studies has been felt necessary to develop good understanding to the research study and to formulate appropriate research methodology. The systematic presentation of the relevant aspects drawn from various literatures not only provides strong base for the empirical investigation, but also facilitates to arrive at a proper understanding of the different components of the problem under study. Keeping in view the objectives of the study, an attempt was made to review the literature, which had meaningful relation to the study and are presented under the following sub headings.

2.1 Profile characteristics of the farmers

2.2 Perception of farmers towards Rural/Agricultural institutional activities and programmes

2.3 Knowledge of farmers regarding the benefits provided under Rural/Agriculture development programmes

2.4 Adoption of farm technologies by farmers

2.5 Association between profile characteristics of farmers with their perception, knowledge and adoption level

2.6 Problems faced by the farmers

2.1 Profile characteristics of the farmers

2.1.1 Age

Sami and Khan (2016) revealed that 56.00 per cent of the farmers belonged to the age group of 30-40 years followed by 44.00 per cent belonged to 40-50 age group.

Babu (2017) observed that majority (57.50%) of the non-beneficiaries of green army labour bank belonged to middle age group, whereas 30.00 and 12.50 per cent of them belonged to old and young age groups, respectively. In case of beneficiaries, 60.00 per cent belonged to middle age group, while 27.50 and 12.50 per cent of them were belonging to old and young age groups, respectively.

Jyothi and Devarani (2019) reported that 70.00 per cent of the farmers from Imphal East district, 59.00 per cent of the farmers from Thoubal district and 68.00 per cent of the farmers from Bishnupur district of Manipur belonged to middle aged category (35-50 years).

2.1.2 Education

Babu (2017) reported that most of the beneficiary farmers of Green Army Labour Bank had medium level of education (52.50%), whereas 47.50 per cent of the non-beneficiaries had low level of education.

Jyothi and Devarani (2019) revealed that 57.00, 59.00 and 63.00 per cent of the farmers had attained secondary level of education in Imphal East, Imphal West and Bishnupur districts of Manipur, respectively.

Tanweer (2019) found that 29.16 per cent of organic farmers were graduates, 26.66 per cent were illiterates, 20.00 per cent of organic farmers had high school education, 12.50 per cent of them studied up to pre university and an equal percentage (5.83% each) of farmers had primary school education and post-graduation.

2.1.3 Family size

Punitha (2017) revealed that more than half of the famers (56.25%) were having medium size family followed by 33.33 and 10.42 per cent of them were having large and small families, respectively.

Jyothi and Devarani (2019) reported that majority of the farmers (85.00%) lived in joint families with a 4-6 members per family.

Chaitra (2020) reported that more than one-third (38.33%) of the beneficiaries National Food Security Mission-Rice had medium size family of 5-7 members followed by small (35.00%) and big (26.67%) size families respectively.

2.1.4 Landholding

Barman *et al.* (2013) reported that majority (70.83%) of the tribals had marginal land holding followed by those with small (15.00%) and medium (14.17%) size land holding.

Jyothi and Devarani (2019) revealed that 35.00 per cent of the farmers from Imphal East district possessed 2 to 4 ha, 37.70 per cent of the farmers from Thoubal district and 49.30 per cent of the farmers from Bishnupur district possessed 1 to 2 ha of cultivable land.

Tanweer (2019) observed that as high as 44.17 per cent of organic farmers sampled were big farmers followed by small farmers (33.33%) and marginal farmers (22.50%).

2.1.5 Annual income

Datta (2013) reported that 43.57 per cent of the farmers had low annual income followed by 33.57 per cent of the respondents having medium annual income and the remaining 22.85 per cent of the respondents had high annual income

Bharath Kumar (2018) observed that a larger proportion (45.63%) of tribal youth were belonging to medium income group. While, 32.50 and 21.88 per cent of tribal youth were belonging to low and high income groups, respectively.

Jyothi and Devarani (2019) revealed that the annual income of the farmers was in the range of Rs. 33,751 to Rs.1,44,000 with 62.02 per cent from Imphal East district, 59.37 per cent from Thoubal district and 60.37 per cent from Bishnupur district of Manipur.

2.1.6 Fallow period

Szvetlana *et al.,* (2009) observed that fallow period had a negative influence on the adoption of organic farming. The government is motivating the farmers to go organic farming by providing subsidies on inputs for helping the farmers with the risk associated with fallowing their land for conversion from commercial agriculture to organic agriculture.

Panneerselvam *et al*. (2011) suggested that the government scheme for compensating yield loss during leaving the land fallow before shifting of farmers from chemical to organic farming, a price premium may help farmers to adopt organic agriculture on a large scale in India.

Sarah (2017) observed that fallowing land by the peasants acted as a barrier to adopt organic farming. Furthermore, it was found that the link between subsidies and the level of organic adoption during the transitioning phase from commercial farming to organic farming was found to be positive.

2.1.7 Organic farming experience

Dympep (2017) observed that higher percentage (44.44%) of the farmers had more of farming experience followed by moderate and less farming experience with percentage distribution of 33.33 and 22.22 per cent, respectively.

Jyothi and Devarani (2019) found that 62.00 per cent of the farmers from Imphal East district, 64.00 per cent from Thoubal district and 60.20 per cent from Bishnupur district of Manipur had medium level of experience in farming ranging from 10-20 years.

Tanweer (2019) observed that half (50.00%) of the farmers had more farming experience followed by 34.16 and 15.83 per cent having moderate and low farming experience, respectively.

2.1.8 Livestock possession

Meena (2010) revealed that 30.00 per cent of farmers belonged to high category of livestock possession followed by medium (27.00%) and low (13.00%) category of livestock possession.

Punitha (2017) observed that poultry followed by piggery, mithun and duckery were reared by the *Jhumias*. It was also found that 86.00 per cent of the *Jhumias* were rearing poultry birds which was mainly reared as a backyard poultry. Similarly, piggery was reared by 48.75 per cent of the *Jhumias.*

Tanweer (2019) reported that 62.50 per cent of the organic farmers belonged to high category of livestock possession, 20.83 per cent of them belonged to medium category and 16.67 per cent of the organic farmers belonged to low category of livestock possession.

2.1.9 Material possession

Mamathalakshmi (2010) observed that 46.67 per cent of farmers belonged to low category of material possession, 27.50 per cent of respondents belonged to medium category and the remaining 25.83 per cent of respondents belonged to high category of material possession.

Punitha (2017) observed that majority of the farmers in Manipur had a low level of material possession (76.25%), while 23.75 per cent of the farmers had a high level of material possession.

Tanweer (2019) revealed that 40.00 per cent of organic farmers belonged to medium category of material possession followed by high (37.50%) and low (22.50%) category of material possession.

2.4.10 Crop productivity

Khoy *et al.* (2015) observed that Cambodian farmers would obtain higher yields and profits by adopting the organic farming practices.

Kiran Kumar *et al.* (2015) concluded that even though the yield was lower under organic farming than the traditional farming, the income was higher due to high premium prices for organic produce.

Tashi and Wangchuk (2016) revealed that there was no significant difference in respect of yield, and net returns between commercial and organic farming.

2.1.11 Achievement motivation

Sunitha (2015) reported that 47.50 per cent of the farmers had medium level of achievement motivation, 29.17 per cent had high level of achievement motivation and 23.33 per cent of farmers had low level of achievement motivation.

Mani (2016) observed that 56.68 per cent of the farmers belonged to medium achievement motivation category followed by low (34.16%) and high (9.16%) level of achievement motivation category.

Tanweer (2019) revealed that 43.33 per cent of the organic farmers had medium level of achievement motivation, 36.67 per cent of organic farmers had high level of achievement motivation and the remaining 20.00 per cent of them had low level of achievement motivation.

2.4.12 Aspiration

Bhuvana (2013) observed that 46.66 per cent of the farmers had medium level of aspiration, whereas an equal per cent of farmers (26.67% each) had low and high-level of aspiration.

Babu (2017) found that aspiration level of 40.00 per cent of the farmers were high, while an equal number of farmers (30.00% each) had low and medium level of aspiration.

Punitha (2017) revealed that 44.58 per cent of the farmers had medium level of aspiration followed by 37.50 per cent of farmers having low aspiration and the remaining 17.91 per cent having a high level of aspiration.

2.1.13 Management orientation

Priya (2010) reported that less than half (41.70%) of the farm women were found to be in the medium management orientation category whereas, 32.50 per cent of the respondents had high level of management orientation and the remaining 25.80 per cent of the participants had low level of management orientation.

Shirur (2015) revealed that an equal percentage (35.00% each) of mushroom growers were having low and high management orientation and the remaining 30.00 per cent of them were having medium level of management orientation.

Chaitra (2020) observed that majority (56.67%) of the farmers had high level of management orientation followed by medium (30.00%) and low (13.33%) level of management orientation.

2.1.14 Economic motivation

Senthil (2009) observed that 47.00 per cent of the farmers had medium level of economic motivation followed by 35.00 per cent had low level of economic motivation and the remaining 18.00 per cent of the respondents had high level of economic motivation.

Riar *et al.* (2017) found that the current price of cotton, large land holding and premium price were the economic motivational factors of organic cotton farmers.

Chaitra (2020) revealed that majority (66.67%) of the farmers belonged to high level of economic motivation, one-fifth (20.00%) of the respondents belonged to medium level and the remaining 13.33 per cent of the farmers belonged to low level of economic motivation.

2.1.15 Risk orientation

Yashodhara (2015) observed that 34.50, 33.80 and 31.70 per cent of the farmers were having low, high and medium level of risk orientation, respectively.

Tanweer (2019) observed that a majority of 54.17 per cent of organic farmers had high level of risk orientation, followed by one fourth (25.83%) of farmers had low level and the remaining 20.00 per cent of the farmers had medium level of risk orientation.

Chaitra (2020) revealed that more than half (53.33%) of the farmers had high risk orientation followed by low (25.00%) and medium (21.67%) level of risk orientation.

2.1.16 Innovative proneness

Mani (2016) reported that a little more than half of farmers belonged to medium level of innovative proneness (52.50%), while 30.00 and 17.50 per cent of the farmers were belonging to high and low level of innovativeness proneness, respectively.

Jyothi and Devarani (2019) revealed that the degree of innovativeness of the farmers ranged in the medium category from 60.00 per cent to 79.00 per cent in the Imphal East, Thoubal and Bishnupur districts.

Tanweer (2019) revealed that 57.50 per cent of the organic farmers had high level of innovativeness followed by low (23.33%) and medium (19.17%) level of innovativeness.

2.1.17 Mass media exposure

Chitra (2011) revealed that three fourth (75.00%) of the Kudumbashree beneficiaries had high level of mass media exposure followed by 16.70 and 8.30 per cent of them were having medium and low mass media exposure respectively.

Tanweer (2019) revealed that 45.00 per cent of the organic farmers had high level of mass media exposure followed by 30.83 per cent and 24.17 per cent of organic farmers belonging to medium and low category of mass media exposure, respectively.

Chaitra (2020) reported that a significant number of farmers (43.33%) had high mass media exposure level followed by medium (35.00%) and low (21.67%) mass media exposure level.

2.1.18 Training on organic farming

Prashanth (2011) found that half (50.00%) of the organic farmers belong to medium level of training undergone followed by high (38.33%) and low (11.66%) level of training undergone.

Tamagond (2013) found that 60.00 per cent of the farmers belonged to high level of training undergone followed by medium (30.00%) and low (10.00%) category of training undergone.

Tanweer (2019) found that the farmers belonged to high category of training undergone followed by medium (21.67%) and low (19.16%) category of training undergone.

2.1.19 Extension agency contact

Darsana (2014) reported that about two-third of the members in the NABARD farmers club had medium level of extension agency contact (65.50%) followed by high (18.30%) and low (16.70%) level of extension agency contact.

Punitha (2017) observed that majority of the farmers (76.30%) had lower extension agency contact followed by 16.20 and 7.50 per cent of the farmers having medium and higher level of extension agency contact, respectively.

Chaitra (2020) revealed that a larger proportion (43.33%) of the farmers belonged to high extension contact followed by low (33.33%) and medium (23.34%) level of extension agency contact.

2.4.20 Extension participation

Mahatab Ali (2010) reported that more than two-fifth (47.78%) of the rice growers had medium level of extension participation, whereas 32.22 and 20.00 per cent of the rice growers had high and low level of extension participation, respectively.

Tanweer (2019) observed that more than half (59.17%) of organic farmers had high level of extension participation, while 25.00 per cent of them had medium level of extension participation and the remaining 15.83 per cent of them had low level of extension participation.

Chaitra (2020) revealed that more than one-third (35.00%) of the National Food Security Mission rice beneficiaries had high level of extension participation followed by low (33.33%) and medium (31.67%) level of extension participation.

2.2 Perception of farmers towards Rural/Agricultural institutional activities and programmes

Narayanappa (1991) revealed that a majority (56.00%) of the farmers had medium level of perception towards the functioning of Regional Research Stations, while 30.00 and 14.00 per cent of the farmers had low and high level of perception towards the functioning of Regional Research Stations, respectively.

Jayanti and Mehta (2002) observed that 37.22 per cent of women trainees had high level of perception about Home science training programmes of Krishi Vignana Kendras, whereas 36.11 and 22.66 per cent of the trainees were having medium and low level of perception about Home science training programmes of Krishi Vignana Kendras, respectively.

Shrinivasa Rao *et al.* (2002) revealed that half of farmers (50.00%) had medium level of perception towards the District Training Centre, followed by 41.66 and 8.34 per cent of the farmers having low and high level of perception towards District Training Centre, respectively.

Sawant *et al.* (2003) observed that a majority (53.63%) of the farmers perceived the extension system in promoting the adoption of improved farming technologies as useful, whereas a sizable number of farmers (36.45%) perceived the extension system in promoting the adoption of improved farming technologies as less useful and less number

(9.80%) of the farmers had perceived the extension system as more useful in promoting the adoption of improved farming technologies

Bagheri *et al.* (2008) indicated that the paddy growers had positive perception towards sustainable agricultural technologies (minimum tillage, reduced use of agrochemicals, mixed use of organic and chemical fertilizer, biologic and cultural control of pests) promoted by Farm Universities.

Kavitha *et al.* (2011) reported that three-fourth (76.00%) of the members perceived the effectiveness of functioning of their self-help groups as poor, whereas 24.00 per cent of the members perceived the effectiveness of functioning of their self-help groups as good.

Pradeep (2012) reported that a majority of farmers (81.25%) had good perception towards the functioning of Krishi Vigyan Kendras and the other 18.75 per cent of the farmers had poor perception towards the functioning of Krishi Vigyan Kendras.

Siddiqui and Siddiqui (2012) reported that 74.10 per cent of the farmers had a better perception about the Farmers Field Schools, whereas 15.90 and ten per cent of the farmers had good and poor perception towards Farmers Field Schools, respectively.

Avinash (2013) reported that a majority of the farmers (71.60%) felt more effective about the functioning of Raitha Samarka Kendras, while 20.80 and 7.50 per cent of them felt effective and less effective about the functioning of Raitha Samparka Kendras, respectively.

Sunil (2014) revealed that 79.17 per cent of the farmers had useful perception about the agricultural technologies promoted by Farmers Field Schools, while 13.75 and 7.08 per cent of the farmers had more useful and less useful perception about the agricultural technologies promoted by Farmers Field Schools, respectively.

Duhan (2017) observed that a vast majority of the farmers (88.90%) believed that crop insurance should not be made compulsory for all farmers. Half of the sampled farmers

said that they have no idea about crop insurance and 46.90 per cent farmers think that it is for all the farmers.

Rupesh *et al.* (2017) reported that less than half (47.00%) of the farmers had medium level of perception towards the effectiveness of Krishi Vigyan Kendras in transferring agricultural technologies to farmers followed by low (36.00%) and high (17.00%) level of perception towards the effectiveness of Krishi Vignana Kendras.

Philip and Sivaraj (2018) revealed that majority (59.44 %) of the certified organic farmers had medium level of perception on crop yield and profitability of organic farming, followed by high (23.89 %) and low (16.67 %) level of perception on profitability of organic farming.

Darshan *et al.* (2019) reported that a large number of farmers (41.67%) had good perception about the functioning of Raitha Samparka Kendra (RSKs), whereas 37.50 and 20.83 per cent of the farmers had better and poor perception, respectively about the functioning of RSKs in the effective dissemination of agricultural technologies to the farming community.

2.3 Knowledge of farmers regarding the benefits provided under Rural/Agricultural development programmes

Neeta (2007) found that majority (57.15%) of the beneficiaries had medium level of knowledge regarding the benefits extended under Swarnajayati Gram Swarojgar Yojana (SGSY), and 27.14 per cent had high level of knowledge. While, only 15.71 per cent of the beneficiaries had low knowledge about the benefits extended under SGSY.

Savithramma (2011) revealed that less than half of the farmers (45.00%) belong to medium level of knowledge about the services provided under Kissan Call Center, while 32.50 and 22.50 per cent of the respondents were belonging to low and high knowledge category, respectively.

Amol and Shrikrishna (2012) reported that a vast majority of farmers (98.00%) were having knowledge of the benefits of crop insurance scheme, while two per cent of the farmers were not having knowledge about the benefits of crop insurance scheme.

Patel (2012) revealed that more than two-fifth (45.83%) of the farmers had partial knowledge about the subsidies provided under National Horticulture Mission followed by 29.17 per cent of the framers had perfect knowledge and about 25.00 per cent of the farmers had no knowledge.

Prasad *et al.* (2012) reported that maximum number of beneficiaries (79.00%) had medium level of knowledge, followed by low (12.00%) and high level of knowledge (9.00%) about different benefits to farmers under ATMA programme.

Sharma *et al.* (2013) revealed that majority (72.50%) of Trainee Farm-Women were having medium level of knowledge regarding the advantages of value addition technology, followed by those (20.00% and 7.50%) having high and low level of knowledge, respectively. Whereas, in case of non-trainee farm women, all of them had low level of knowledge regarding value addition technologies.

Sundar and Lalitha (2013) reported that 60.00 per cent of the farmers were having knowledge on the advantages of crop insurance scheme and the remaining 40.00 per cent of the farmers were not having knowledge about the advantages of crop insurance scheme.

Alawa (2014) reported that 45.45 per cent of the ATMA beneficiaries were having medium level of knowledge regarding the benefits for farmers under ATMA, while 30.00 and 24.55 per cent of the respondents were having high and low level of knowledge, respectively.

Bori (2014) reported that 43.75 per cent of the SGSY beneficiaries had medium level of knowledge about the benefits extended to farmers under SGSY, while 23.75 per cent and 32.50 per cent of the respondents had high and low level of knowledge, respectively.

Jagyanseni Nayak (2014) reported that a majority of the farmers (80.00%) were having correct knowledge about the benefits and activities of National Food Security Mission programme, while the remaining 20.00 per cent of the farmers were having incorrect knowledge about the benefits and activities of National Food Security Mission programme.

Kalamkar and Swain (2015) observed that 51.00 per cent of farmers were having knowledge on the benefits provided to the beneficiaries under RKVY programme and the other 49.00 per cent of the farmers were not having knowledge.

Singh *et al.* (2015) reported that 63.75 per cent of farmers had medium level of knowledge about the cafeteria of activities of ATMA, followed by low level of knowledge (18.75%) and high level of knowledge (17.50%).

Amarendar (2017) reported that a vast majority of beneficiaries (92.40%) were having knowledge about the advantages of Soil Health Card scheme, while 7.60 per cent of the beneficiaries were not having knowledge.

Mohapatra *et al.* (2017) observed that 96.37 per cent of the women had knowledge about the benefits extended to the beneficiaries under Janani Suraksha Yojana scheme, while only 3.63 per cent had no knowledge, about the scheme.

Darshan (2018) reported that nearly half of the farmers (48.34%) were having high level of knowledge about the benefits extended to the farmers under National Food Security programme and Soil Health Management Schemes. On the other hand, one-third (33.33%) and 18.33 per cent of the farmers were having medium and low level of knowledge regarding the benefits extended to the farmers, respectively.

2.4 Adoption of farm technologies by farmers

Bhingardeve *et al.* (2010) revealed that almost all the wheat growers were adopting the water management practices. They also observed that technologies like sowing time and crop duration were adopted by majority (60.00 %) of wheat growers. Most of the wheat

growers were not adopting practices as per recommendations in respect of sowing, aphids and jassids pest control and disease control measures (80.00 %).

Manjunath (2010) reported that majority (62.85 %) of the farmers were belonging to medium adopter group, followed by 24.57 per cent belonged to low adoption group and least per centage of respondents (12.57%) belonged to under high adoption group of plant protection practices of paddy cultivation.

Sahu *et al.* (2010) found that half (50.00%) of the farmer trainees were having medium level of adoption of improved cultivation technologies of wheat and 33.63 per cent as well as 16.37 per cent were found in high and low category, respectively in respect of trained groups. The respondents from the trained category also showed higher overall extent of adoption of improved wheat cultivation technologies.

Assis and Ismail Mohammed (2011) reported that 90.30 per cent of the farmers were practicing manual weeding, 58.10 per cent of farmers were using organic fertilizer and 51.60 per cent of respondents were practicing crop rotation.

Samota (2011) revealed that 51.98 per cent of the total farmers adopted the high yielding varieties of wheat crop to a high level, whereas 38.16 and 9.86 per cent of the respondents adopted the high yielding varieties of wheat crop to medium and low level, respectively.

Shinogi (2011) found that 58.70 per cent of farmers have fully adopted bio pesticides followed by partially adopting the pesticides (38.80%) and the remaining 2.50 per cent of the farmers had not used bio-pesticides.

Sharma *et al.* (2011) revealed that more number of rice growers (46.00 %) were found to be from medium adoption level group, whereas 32.00 per cent of the respondents were reported from the group of low adoption level and 22.00 per cent respondents were in the high adoption level of recommended cultivation practices.

Adesope *et al.* (2012) reported that a majority of farmers adopted the practices of crop rotation and mixed cropping (69.00%), hand weeding and hoeing (63.40%), slash and burn (58.90%) and intercropping (50.00%).

Shashidhara (2012) in his study about adoption of eco-friendly technologies by cotton growers, revealed that majority of respondents (70.00%) was in medium level adoption of eco-friendly technologies. With respect to adoption of integrated nutrient management, majority of the respondents (60.00%) were not adopting, application of organic manures, selection of crops and cropping pattern, mixed cropping, inter-cultivation practices and application of bio-fertilizers, and use of limited in organic fertilizers.

Verma *et al*. (2012) reported that majority of the farmers (55.00%) were belonging to medium level of adoption of organic farming practices, whereas 36.67 and 8.33 per cent of farmers were belonging to low and high level of adoption of organic farming practices, respectively.

Sharma *et al.* (2017) revealed that a majority of organic farmers (65.00%) were belonging to medium level of adoption of organic farming practices, while 13.00 and 22.00 per cent of them were belonging to high and low category of adoption of organic farming practices, respectively.

Singh *et al.* (2019) observed that as high as 60.00 per cent of farmers were found in medium adoption category, while 22.00 and 18.00 per cent of farmers were belonging to low and high adoption categories of organic farming practices, respectively.

Tanweer (2019) revealed that 58.33 per cent of farmers belonged to high category of adoption followed by low (24.17%) and medium (17.50%) level of adoption of organic farming practices.

Chaitra (2020) found that the half of the National Food Security Mission rice beneficiaries belonged to high adoption level (50.00%), while more than one third (35.00%) of the respondents belonged to medium level and the remaining 15.00 per cent

of the beneficiary farmers belonged to low adoption level category of rice cultivation practices.

2.5 Association between profile characteristics of farmers with their perception, knowledge and adoption level

2.5.1 Association between profile characteristics of the farmers with their perception

Soni *et al.* (2012) conducted a study on impact of training programmes on adoption of organic farming practices and found that innovativeness and knowledge about organic farming were found to be having significant association with the perception of trained farmers about the benefits of organic farming practices promoted by farm universities.

Subhash (2012) revealed that age, training received, reading habit, land holding, annual income, extension participation, mass media, economic motivation, risk orientation and innovativeness of farmers had significant association with their perception towards agricultural extension services of public extension providers.

Anna (2013) revealed that there was a significant association between age, household size, farm size and extension contact of farmers with their perception on effectiveness of extending the supply and services to the farmers by the Agricultural Extension Agents of public extension system.

Avinash (2013) revealed that, annual income, land holding, mass media participation, organizational participation, extension contact, frequency and purpose of visit to Raitha Samparka Kendras, extension participation, cosmopoliteness, scientific orientation and innovative proneness of farmers were significantly associated with the perception about the functioning of Raitha Samparka Kendras.

Sunil (2014) reported that land holding, annual income, management orientation and perception of farmers had significant association with the perception towards the activities of farmers field schools.

Preethi (2015) reported that farming experience, achievement motivation, rural-urban background, organizational climate, decision making ability, innovativeness, mass media use and participation of farm youth in training programme were having positive and significant association with perception towards the activities of rural youth clubs.

Kangale *et al.* (2016) revealed that education, subsidiary occupation, extension contacts, social participation, benefits availed and crops covered in crop insurance programme were positively and significantly associated with the perception of farmers towards the benefits extended to farmers under crop insurance programmes.

Sathish *et.al* (2016) revealed that mass media utilization, scientific orientation, innovativeness and economic motivation of farmers had significant association with their perception of service quality of extension services and activities relating to the supply of agricultural inputs provided by public extension organizations.

Madan *et.al* (2017) reported that education, farm size, extension contact, information seeking behavior, information management behavior and innovativeness of farmers were significantly associated with their perception towards the activities of mobile based agro advisories.

Darshan (2018) reported that farmers' characteristics such as education, scientific orientation, risk orientation, achievement motivation, management orientation, innovativeness and extension agency contact had significant to highly significant association with the perception of the farmers towards the activities undertaken by Raitha Samparka Kendras.

2.5.2 Association between profile characteristics of the farmers with their knowledge level

Venkatesh *et al.* (2013) reported that the age and education of the farmers had significant association with their knowledge regarding the quality agricultural extension services of public service providers.

Alawa (2014) reported that, age, education, farming experience, achievement motivation, training undergone, decision making ability and mass media use were having positive and significant association with the knowledge level of the farmers regarding the supply and services of public extension system.

Madhuri (2014) revealed that, knowledge of farmers about the benefits of ATMA was not associated by age, education, family size, occupations, social participation, income and diet of farmers.

Khoy *et al.* (2015) observed that the knowledge of farmers regarding the benefits provided by farm universities to promote organic farming practices was positively associated related to the subsidies given on agricultural inputs.

Choudhary and Yadav (2017) revealed that the knowledge level of beneficiary farmers regarding the extension activities of public service providers was positively and significantly associated with their education, social participation, size of land holding, and economic motivation.

Suman (2017) reported that education and farming experience were having positive and significant association with the knowledge level of farmers regarding the benefits extended by farmers training institute.

Thirumoorthy and Geetha (2017) reported a significant association between gender, educational qualification, farm size and source of knowledge about crop insurance of farmers with the level of knowledge on the benefits of crop insurance scheme, whereas there was no significant association between age, annual income and type of family of farmers with the level of knowledge on the benefits of crop insurance scheme.

Anju Duhan and Meenakshi Dhingra (2018) observed that age and education had significant association with the knowledge level of farmers about the advantage of crop insurance scheme.

Darshan (2018) revealed that farmers' characteristics such as education, scientific orientation, risk orientation, achievement motivation, management orientation, innovativeness and extension agency contact had significant to highly significant association with the knowledge of the farmers regarding the benefits extended under National Food Security Mission.

Triveni *et al.* (2018) reported that the knowledge of beneficiary farmers about the benefits provided under Dairy Development Programmes had positively and significantly associated with income, innovativeness, decision making ability, risk bearing ability, economic orientation, scientific orientation, information seeking behaviour and communication channels.

2.5.3 Association between profile characteristics of farmers with their adoption level

Shashidhar (2006) found that achievement motivation, innovative proneness, scientific orientation, risk orientation, economic motivation, extension participation, institutional participation, cosmopoliteness, mass media utilization and attitude towards chemical fertilizers of farmers exhibited significant association with adoption of eco-friendly technologies.

Venkata Shiva Reddy (2006) revealed that innovativeness, farm decision making, achievement motivation, risk taking ability, information seeking behaviour and cosmopoliteness of farmers were significantly associated with the adoption of integrated pest management practices in both tomato and cabbage crops.

Thippeswamy (2007) reported that variables like education, land holding, training received, source of irrigation, annual income, social participation, mass media utilization, extension participation, economic motivation and innovative proneness of coconut growers had significant association with adoption level of plant protection measures of coconut crop.

Ananthnag (2011) found that annul income, social participation, mass media participation and economic motivation of farmers practicing organic farming were significantly associated to their socio-economic status.

Prashanth (2011) reported that age and mass media exposure of organic cotton farmers were positively associated to the adoption level of cultivation practices.

Verma *et al.* (2012) reported that social participation, cosmopoliteness and risk bearing capacity of farmers contributed positively and significantly towards adoption of farm practices at 0.01 level of probability. Whereas, education, total number of family member involved in farming, training programme attended, extension contact and infrastructure facility of farmers contributed positively and significantly towards adoption of farm practices at 0.05 level of probability.

Naik (2016) revealed that farming experience, training received, cosmopoliteness, livestock possession and extension participation of red gram growers had association with adoption of organic farming practices.

Jyothi and Devarani (2019) reported that age, annual income and family size of farmers had positive association with the extent of adoption of farm technologies.

Tanweer (2019) found that age, training undergone, material possession, livestock possession, farming experience, extension participation, social participation, information seeking behaviour, scientific orientation, achievement motivation, mass media participation, innovativeness, cosmopoliteness, risk orientation and leadership ability of organic farmers had significant association with adoption of organic farming practices.

Chaitra (2020) reported that the variables namely family size, farming commitment, mass media exposure, extension contact, economic motivation, scientific orientation, orientation towards incentives and management orientation of rice growers were found to have significant associations with differential levels of adoption of National Food Security Mission interventions.

2.8 Problems faced by the farmers

Gorade *et al.,* (2008) found that lack of knowledge about certification, high cost for certification, no proper guidance and marketing problem are major obstacles faced by farmers in organic farming.

Bhingardeve *et al.* (2010) observed that majority of wheat growers faced the constraints about non-availability of seed of improved varieties (91.67 %) followed by high cost of fertilizers (89.17 %), untimely supply of seed (62.50 %) and high cost of plant protection chemicals (51.67 %).

Samota (2011) reported that shattering with over maturity, susceptibility to diseases, non-availability of high yielding variety seeds at local level, lack of knowledge on recommended cultivation practices, poor quality of high yielding variety seeds and higher requirement of manure and fertilizers were the major constraints faced by farmers in the adoption of recommended high yielding varieties of wheat.

Shinogi (2011) expressed that shortage of disease free planting materials, lack of timely technical information, non-availability of enough organic inputs and non-availability of unique package of practices as the major technological constraints faced by the organic farmers.

Patel *et al.* (2015) reported that an overwhelming majority (85.50%) of the bhil farmers stated lack of awareness about various developmental programmes or schemes and delays in implementation of schemes (75.00%) were the obstacles in availing the benefits.

Costly certification charges, unavailability of organic inputs, lack of technical advice related to organic farming, and lack of separate market are the major constraints faced by the organic red gram growers (Naik, 2016).

Patel *et al.* (2016) revealed that government official having apathetic attitude towards common people ranked as first socio-psychological constraint, followed by benefits given to one group of people and difficulty in learning milking practices and dairy husbandry were the constraints faced by dairy farmers.

Singh *et al.* (2016) reported that untimely availability of seed, lack of knowledge regarding high yielding varieties, inadequate irrigation facility, high cost of high yielding variety, and lack of finance were the important constraints responsible for low adoption of seed technology by the farmers. While, the important constraints faced by the farmers were responsible for low adoption in case of plant protection technology are: lack of knowledge, lack of technical help, non-availability of plant protection equipment, high cost of pesticide and fungicides' and non-availability of agro-chemicals.

Yepthomi (2016) revealed that low price, low profit, lack of transport facilities, lack of extension services, and lack of irrigation water are some of the major constraints behind the low productivity of rice cultivation.

Damor and Khadayata (2017) revealed that lack of special administrative set up to promote organic farming (60.00%), lack of price awareness regarding organic food in people (58.34%), lack of marketing network for organic products (54.16%), controversy among family members regarding organic farming (50.84%), no special incentive or awards for adopters of organic farming practices (48.34%), inadequate and untimely supply of organic agricultural inputs (46.66%), too much distance between producer and market or delivery point (45.00%), poor contact of extension workers with farmers (41.66%), lack of market facility for organic produced commodity (40.00%), lack of publication on proven organic farming practices (29.16%) and difficult to manage insects and pests (17.50%) were the major constraints faced by the farmers in the adoption of organic farming practices.

Sharma *et al.* (2017) expressed that lack of confidence, lack of knowledge on improved technologies, lack of suitable technologies and lack of technical backstopping were the major production constraints faced by farmers. Non availability of crop insurance, lack of marketing facilities, inadequate extension personnel, insufficient training programmes and weak extension system were the major institutional constraints of farmers.

Kalirajan and Supriya (2019) revealed that the foremost physical constraint expressed by vast majority of the farmers was inundation due to labour scarcity (80.00%).

Among the communication constraint, the foremost communication constraints expressed by most of the respondents was lack of training (85.00%). Among the personal constraints, the foremost personal constraints expressed by most of the respondents was lack of knowledge to identify bio-agent (88.00%). Among the socio-economic constraint, the foremost socio-economic constraint expressed by majority of the respondents was high cost of agricultural inputs (83.00%).

No premium price for organic produce, reduced yield during conversion period, inadequate availability of organic inputs and no separate market for organic produce and lack of uniformity in the size of produce were the major constraints expressed by the organic farmers (Tanweer, 2019).

Chaitra (2020) found that lesser amount of subsidy, limited number of demonstrations, lack of initiative from government officials for conducting farmers field schools, red-tapism, lack of competence of agricultural extension personnel in conducting farmers field school, non-availability of critical inputs, political interference and biased towards large land owners in availing benefits were some of the major problems faced by the farmers.

III METHODOLOGY

Any research effort must have a strong theoretical foundation for its success. It revolves around the three pivots of plan, structure and strategy of research study. Plan includes everything the investigator does from the selection of research problem to the final analysis of data. The structure is the outline and the process of integrating the variables of investigation into a cohesive piece of analysis. The strategy refers to the specific methods, which are used, for obtaining the data, analysing it, verifying it and interpreting the results. This chapter deals with the various tools and methods, employed for the study. The details are given in the following sub-heads.

3.1 Locale of the study

3.2 Research design

3.3 Variables considered for the study

3.4 Operationalization and measurement of dependent variables

3.5 Operationalization of independent variables and their measurements

3.6 Impact of Mission Organic Value Chain Development Scheme on crop yield and income of aromatic black rice growers

3.7 Documentation of case studies of successful aromatic black rice growers

3.8 Problems faced by aromatic black rice growers in Mission Organic Value Chain Development Scheme

3.9 Suggestions of aromatic black rice growers to overcome the problems in Mission Organic Value Chain Development Scheme

3.10 Development of interview schedule

3.11 Data collection

3.12 Analysis of data

3.13 Conceptual model of the study

3.1 Locale of the study

3.1.1 Selection of districts

Manipur state has nine districts, namely, Bishnupur, Chandel, Churachandpur, Imphal East, Imphal West, Thoubal, Senapati, Tamenglong and Ukhrul. The Mission Organic Value Chain Development Scheme (MOVCDS) was implemented by Manipur Organic Mission Agency (MOMA) in all the nine districts of Manipur where export-oriented crops viz., Black aromatic rice, Ginger, Tamenglong Orange, King Chilli, Kachai Lemon and Pineapple are cultivated. MOVCDS was implemented in the dominant aromatic black rice growing areas of Bishnupur, Imphal East, Imphal West and Thoubal districts during 2017-2018.

The present research study was conducted in Thoubal and Bishnupur districts of Manipur, where the first phase of Mission Organic Value Chain Development Scheme (MOVCDS) was implemented from 2017-2018 to 2019-20. Thoubal (500 beneficiaries) and Bishnupur (493 beneficiaries) districts had a larger number of aromatic black rice growers availing the benefits under MOVCDS during the phase I (Table A), hence these two districts were purposively selected from among the four districts that were covered under MOVCDS in Manipur. The same beneficiaries have derived benefits under MOVCDS for all the three years in phase I. Figure 1 depicts the map for the study area.

Table A: Area under MOVCDS and number of beneficiaries in phase I

Sl. No.	District	Area under MOVCDS (ha)	No. of beneficiaries
1	Thoubal	500	500
2	Bishnupur	500	493
3	Imphal West	500	410
4	Imphal East	500	427

3.1.1.1 Thoubal district

Thoubal district is bounded by Senapati district on the north, Ukhrul and Chandel districts on the east, Churchandpur and Bishnupur districts on the south and Imphal West

and Imphal East districts on the west. Thoubal town is the district headquarter of Thoubal district. The district occupies larger part of the eastern half of the Manipur Valley. The shape of the district is an irregular triangle with its base facing north. It lies between 24°30'24.688" N to 24°43'16.689" N latitude and 93°53'17.016" E to 93°53'18.118" E longitude. Its average elevation is about 790 m above the sea level.

Thoubal district has three taluks namely, Thoubal, Kakching and Lilong. Agriculture is the most important source of livelihood for the people of this district of Manipur. More than 70 per cent of the total population of the district is directly or indirectly are engaged in agricultural activities. The valley is fertile, where the major component of soil consists of alluvium of fluvio-lacustrine and the topography of Thoubal district provides good opportunity for irrigation, natural as well as artificial. Rice accounts for above 90 per cent of the total land area under cultivation.

3.1.1.2 Bishnupur district

Bishnupur district lies in the south-western corner of the Manipur valley (also known as Imphal valley) lying between latitude 240 18’ 49" N and 240 42’ 16" N and longitude 930 47’ 2" E and 930 53’ 6" E approximately. The north-south extension of the district is about two times longer than the east-west extension. The district wholly belongs to the valley region. The surface of the district gradually slopes towards east and south-east. A number of hillocks, like Ishok (947 m above the mean sea level), Maibam Lokpaching (892 m above the mean sea level), Laithouching (838 m above the mean sea level), etc. are found spotted in the northern portion of the district. The Loktak lake, which is the biggest fresh water lake in the North eastern India, occupies the heartland of this district. Bishnupur has three taluks namely, Bishunpur, Moirang and Nambol. The district enjoys two types of soils, *viz.,* Red lateritic soil, and Black/Swampy soil. Red lateritic soil is found along the western foothills formed by soils brought down from the hills. Black/swampy soil is found in the eastern and southern portions of the district. The soil found in the district is fertile and suitable for agriculture in general and rice cultivation in particular. Single cropping pattern is generally followed in the district. Rice and vegetables constitute the main crops of the district.

3.1.2 Selection of taluks

The first phase of MOVCDS was implemented in all the taluks of Thoubal and Bishnupur district, hence all the three taluks (Lilong, Thoubal, and Kakching) of Thoubal district and all the three taluks (Nambol, Bishnupur, and Moirang) of Bishnupur districts were selected for the research study.

3.1.3 Selection of villages

Three villages from each of the sampled six taluks were randomly selected for the study. Eighteen villages selected for the study are presented in Table B.

Table B. Number of aromatic black rice growers sampled for the study

Sl. No.	District	Taluks	Villages	No. of respondents
I	Thoubal	A. Lilong	1. Kekeman	10
			2. Uchiwa	10
			3. Oinam	10
		B. Thoubal	4. Bengi	10
			5. Lourembam	10
			6. Ukhongsang	10
		C. Kakching	7. Aimol	10
			8.Kakching Khunou	10
			9. Elangkangkokpi	10
II	Bishnupur	D. Nambol	10. Irengbam	10
			11. Keinou	10
			12. Oinam	10
		E. Bishnupur	13. Phubala	10
			14. Thinungei	10
			15. Sunsuiphai	10
		F. Moirang	16. Heman	10
			17. Wangoo Sabal	10
			18. Moirang Oksongbung	10
Total	2	6	18	180

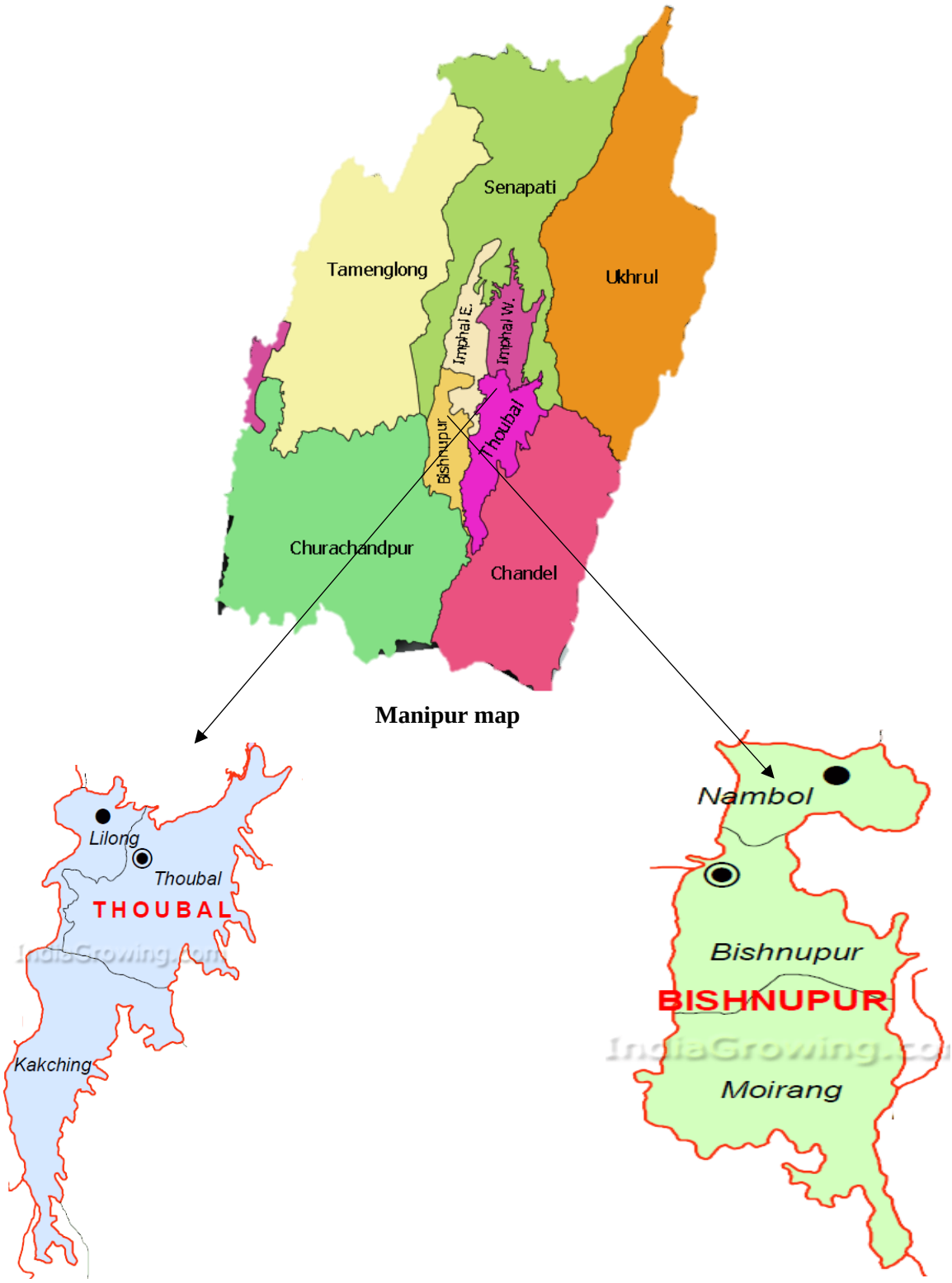

Fig. 1: Map showing the study area

3.1.4 Selection of respondents

From each of the selected 18 villages, ten beneficiary aromatic black rice growers (who were practicing the transplanting method of rice cultivation) were randomly selected for the study. Thus, the total number of beneficiary aromatic black rice growers sampled for the research study was 180. More than 90 per cent of the beneficiary aromatic black rice growers of MOVCDS were practicing transplanting method of rice cultivation. Hence, the beneficiary aromatic black rice growers who were practicing transplanting method of rice cultivation were purposively selected for the study. The village-wise number of respondents selected for the research study are presented in Table B.

3.2 Research design

Kerlinger (1995) defined research design as *'the plan and structure of investigation so conceived as to obtain answer to such research questions'*. Expost-facto research design was followed for conducting the study. Robinson (1976) defined expost-facto research design '*as any systematic enquiry into which the independent variables have not been directly manipulated because they have already occurred or they are inherently not manipulated'.* Keeping this in view, the adaptability of the proposed design with respect to the type of study, variables under consideration, size of respondents and phenomenon were studied.

3.3 Variables considered for the study

3.3.1 Dependent variables

Perception of aromatic black rice growers towards MOVCDS, knowledge of aromatic black rice growers regarding the benefits provided under the MOVCDS and adoption of organic farming practices by aromatic black rice growers were selected as dependent variables for the study.

3.3.2 Independent variables

Twenty profile characteristics of aromatic black rice growers were selected as independent variables for the study. The details of the dependent and independent variables

selected and the techniques employed for measurement of the variables are presented in Tables C and D.

Table C: Dependent variables and their empirical measurement

Sl. No.	Dependent variables	Empirical measurement
1	Perception towards MOVCDS	Scale developed for the study
2	Knowledge regarding the benefits provided under MOVCDS	Procedure followed by Reddy (2018)
3	Adoption of organic farming practices	Schedule developed

Table D: Independent variables and their empirical measurement

Sl. No.	Independent variables	Empirical measurement
1	Age	Chronological age of the respondents
2	Education	Procedure followed by Darshan (2018)
3	Family size	Schedule developed
4	Landholding	Schedule developed
5	Annual income	Procedure followed by Deepak (2003)
6	Fallow period	Schedule developed
7	Organic farming experience	Schedule developed
8	Livestock possession	Procedure followed by Tanweer (2019)
9	Material possession	Procedure followed by Hiremath (2000)
10	Crop productivity	Schedule developed for the study
11	Achievement motivation	Scale developed by Singh (1978)
12	Aspiration	Scale developed by Cantrill (1965)
13	Management orientation	Scale developed by Samanta (1977)
14	Economic motivation	Scale developed by Supe (1969)
15	Risk orientation	Scale developed by Supe (1969)
16	Innovative proneness	Scale developed by Moulik and Rao (1973)
17	Mass media exposure	Procedure followed Byrareddy (1971)
18	Training on organic farming	Schedule developed
19	Extension agency contact	Procedure followed by Byrareddy (1971)
20	Extension participation	Procedure followed by Trivedi (1963)

3.4 Operationalization and measurement of dependent variables

3.4.1 Perception of aromatic black rice growers towards Mission Organic Value Chain Development Scheme

This section deals with the development of standardised scale to analyse the perception of aromatic black rice growers towards MOVCDS.

3.4.1.1 Development of scale to analyse the perception of aromatic black rice growers towards MOVCDS

Perception of the aromatic black rice growers towards MOVCDS has been operationally defined in the present research study as *'the degree to which an individual has understood the value chain activities of production, supporting and processing and marketing components of MOVCDS'.*

The method suggested by Likert (1932) and Edwards (1969) in developing summated rating scale was followed in the construction of the scale to analyse the perception of beneficiary aromatic black rice growers towards MOVCDS, wherein the following seven steps were followed in the development of the perception scale: 1) Identification of components of MOVCDS, 2) Collection of items/statements, 3) Editing of perception statements, 4) Relevancy test, 5) Item analysis, 6) Reliability test, and 7) Validity.

3.4.1.1.1 Identification of components of MOVCDS

Production, support, and processing and marketing components, the value chain activities pertaining to the MOVCDS were identified for developing the perception scale to analyse the perception of aromatic black rice growers towards MOVCDS.

3.4.1.1.2 Collection of statements

A tentative list of 36 perception statements/items classified under production, supporting and processing and marketing components was prepared through extensive review of literature and by consulting the social scientists and MOVCDS officials.

3.4.1.1.3 Editing of perception statements

Thirty-six perception statements were edited as per the 14 criteria enunciated by Edwards (1969) and Thurstone and Chave (1929). As a consequence, two perception statements were eliminated and the remaining 34 perception statements were included for the study (vide Appendix I).

3.4.1.1.4 Relevancy test

Thirty-four perception statements were sent to 110 experts in the field of social sciences working in State Agricultural Universities, Indian Council of Agricultural Research Institutes and Development Departments, to critically evaluate the relevancy of each statement *viz.*, Most Relevant (MR), Relevant (R), Somewhat Relevant (SWR), Less Relevant (LR) and Not Relevant (NR) with the score of 5,4,3,2 and 1, respectively (Appendix – I). The judges were also requested to make necessary modifications and additions or deletion of statements, if they desired to. A total of 66 judges returned the questionnaires duly completed and these were considered for further processing.

From the data gathered, 'Relevancy Percentage (RP)' and 'Mean Relevancy Score (MRS)' were worked out for all the 34 perception statements. Using RP and MRS, the individual perception statements were screened for relevancies using the following formulae:

a) Relevancy Percentage (RP): It was obtained by using the following formula:

$$RP = \frac{MR\times5 + R\times4 + SWR\times3 + LR\times2 + NR\times1 \times 100}{\text{Maximum possible score}}$$

b) Mean Relevancy Score (MRS): It was worked out using the following formula :

$$MRS = \frac{MR\times5 + R\times4 + SWR\times3 + LR\times2 + NR\times1}{\text{Number of judges responded}}$$

Accordingly, the perception statements having 'Relevancy percentage' of 75 per cent and above and Mean Relevancy Score of 3.75 and above were considered for the final

selection. Accordingly, 26 perception statements were retained after relevancy tests and these statements were suitably modified and written as per the comments of the judges wherever applicable.

3.4.1.1.5 Item analysis

Twenty-six perception statements were subjected to item analysis to delineate the items based on the extent to which they can differentiate the respondents having better perception from the respondents with poor perception regarding MOVCDS.

A sample of 35 aromatic black rice growers from Imphal West district (non-sample area) of Manipur state were interviewed for the study. The respondents were asked to indicate their degree of agreement or disagreement with each perception statement on a five-point continuum ranging from 'strongly agree' to 'strongly disagree'. Based upon the total scores, the respondents were arranged in descending order. The top 25 per cent of the respondents with their total scores were considered as the better group and the bottom 25 per cent as the poor group. These two groups provided criterion groups in terms of evaluating the individual statements. Thus, out of 35 aromatic black rice growers to whom the items were administered for item analysis, eight respondents with highest and eight respondents with lowest scores were used as criterion groups to evaluate individual items. The critical ratio, that is, the 't' value which analyses the extent to which a given statement differentiates between the better and poor perception groups of aromatic black rice growers for each statement, was calculated by using the following formula:

$$t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{\sum X_H^2 - \frac{(\sum X_H)^2}{n} \times \sum X_L^2 - \frac{(\sum X_L)^2}{n}}{n(n-1)}}}$$

Where,

$\bar{X}H$= The mean score on given statement of the high group

$\bar{X}L$ = The mean score on given statement of the low group

$\sum X2H$= Sum of squares of the individual score on a given statement for high group

$\sum X2L$ = Sum of squares of the individual score on a given statement for low group

n = Number of respondents in each group

$\sum$ = Summation

t = The extent to which a given statement differentiates between the high and low groups.

After computing the 't' value for all the 26 perception statements, as many as 18 perception statements (six statements each under production, supporting, and processing and marketing components) with 't' value equal to or greater than 1.67 were selected for the final perception scale.

3.4.1.1.6 Reliability

Reliability refers to '*the precision of the scale constructed for any purpose'*. A reliability test will be reliable when it gives the same repeated result under the same conditions. In any social science research, a newly constructed scale has to be tested for its reliability before it is used. The split-half method was employed to test the reliability of the perception scale. The value of correlation coefficient was 0.5518 and this was further corrected by using Spearman Brown formula to obtain the reliability coefficient of the whole set. The 'r' value of the scale was 0.771, which was found to be significant at one per cent level indicating the high reliability of the scale. Thus, it could be concluded that the perception scale constructed was reliable

a) Half test reliability formula

$$r_{½} = \frac{N(\Sigma XY) - (\Sigma X)(\Sigma Y)}{\sqrt{(N\Sigma X^2 - (\Sigma X)^2)\,(N\Sigma Y^2 - (\Sigma Y)^2)}}$$

Where,

ΣX= Sum of the scores of the odd number items

ΣY = Sum of the scores of the even number items

ΣX^2= Sum of the squares of the odd number items

ΣY^2 = Sum of the squares of the even number items

b) Whole test reliability formula

$$r_{11} = \frac{2.r_{1/2}}{1 + r_{1/2}}$$

Where,

$r_{1/2}$= Half test reliability

3.4.1.1.7 Validity

It refers to '*how well a scale analyses what it is purported to measure'*. The square root of whole test reliability value ($r_{1/2}$) gives the validity value. The data was subjected to statistical validity, which was found to be 0.8430. Hence, the validity coefficient was also found to be appropriate and suitable for the tool developed. Thus, the developed scale to analyse perception of beneficiary aromatic black rice growers towards MOVCDS was found to be valid.

$$(V) = \sqrt{r_{11}}$$

3.4.1.1.8 Administration of the scale

The final perception scale consists of 18 statements for determining the perception of beneficiary aromatic black rice growers. The response could be collected on a five-point continuum, namely, strongly agree, agree, undecided, disagree and strongly disagree with assigned score of 5,4,3,2 and 1 for positive statements, and reverse scoring for negative statements respectively. Thus, the minimum and maximum score one could get is 18 and 90, respectively. The perception score of a respondent was calculated by adding up the scores obtained by him/her on all items/statements. Higher score on this scale indicates that the respondent has higher level of perception towards MOVCDS.

Based on the total cumulated score obtained, the aromatic black rice growers were classified into three categories *viz.,* poor, good and better level of perception based on the mean and half standard deviation.

Sl. No.	Perception categories	Production component (Score)	Supporting component (Score)	Processing and marketing component (Score)	Over all perception (Score)
1	Poor (Below Mean- ½ SD)	15.37	15.42	11.09	41.87
2	Good (Mean± ½ SD)	15.37 - 17.85	15.42 - 18.02	11.09 - 13.09	41.87 -48.97
3	Better (Above Mean + ½ SD)	17.85	18.02	13.09	48.97
Mean		16.61	16.72	12.09	45.42
Standard deviation		2.49	2.60	2.00	7.09

3.4.2 Knowledge of aromatic black rice growers regarding the benefits provided under the Mission Organic Value Chain Development Scheme

Knowledge is operationalized in the present research study '*as the extent to which the benefits provided under MOVCDS are known to the aromatic black rice growers*. A teacher made test was developed to measure the knowledge level of aromatic black rice growers regarding the benefits provided under MOVCDS. Thirteen benefits which were provided under MOVCDS (Reddy, 2018) were considered for the study. The answers elicited from the aromatic black rice growers were quantified by giving scores. Each correct answer for the knowledge item by the respondents was given a score of one and for the incorrect answer mentioned by the respondents for the knowledge item was assigned a score of zero. Thus, the maximum score one could get was 13 and the minimum being zero.

The total knowledge score for each respondent was calculated by summing up the scores obtained for all the 13 knowledge items. Later, the respondents were grouped into low, medium and high knowledge categories based on the mean (10.53) and half standard deviation (0.95) as measure of check.

Category	Criteria	Criterion score
Low	<(Mean- ½ SD)	< 9.58
Medium	(Mean± ½ SD)	9.58 - 11.48
High	>(Mean- ½ SD)	>11.48

3.4.3 Adoption of organic farming practices by aromatic black rice growers

Adoption in the present study has been operationalised *'as the extent of organic farming practices followed by the aromatic black rice growers'.* Organic cultivation practices for aromatic black rice were identified by consulting agronomists, soil scientists, pathologists and entomologists of University of Agricultural Sciences, Bangalore and Programme Co-ordinator of MOVCDS. Fifty-four organic rice farming practices *viz.*, variety (1 No.), seed rate (1 Nos.) nursery practices (4 Nos.), preparation of main field (3 Nos.), planting seedling in the main field (3 Nos.), nutrient management practices (9 Nos.), water management practices (4 Nos.), weed management practices (10 Nos.), plant protection measures (16 Nos.) and harvesting practices (1 No.) advocated under MOVCDS were included for the research study.

Fifty-two organic rice farming practices were presented to the beneficiary aromatic black rice growers. The following pattern of different weightages for each organic farming practice was followed.

Particulars	Score
Full adoption	3
Partial adoption	2
Non-adoption	1

The procedure followed by Sengupta (1967) for the calculation of adoption quotient was used to measure the adoption level of the respondents.

$$\text{Adoption quotient} = \frac{\text{Adoption score one has got}}{\text{Maximum adoption score one can get}} \times 100$$

The minimum and maximum score one could get was 52 and 156, respectively. Based on the total score obtained by each respondent, they were grouped into, low, medium and high adoption categories using mean (112.66) and half standard deviation (10.08) as a measure of check.

Category	Criteria	Criterion score
Low	<(Mean- ½ SD)	< 102.58
Medium	(Mean± ½ SD)	102.58 - 122.74
High	>(Mean- ½ SD)	>122.74

3.5 Operationalization of independent variables and their measurement

3.5.1 Age

It refers to the chronological age of the respondents in completed years at the time of investigation. Based on the completed years, the respondents were classified as young, middle and old age.

Category	Criteria (years)
Young	<35
Middle	35-50
Old	>50

3.5.2 Education

It is the number of years of formal education acquired by the aromatic black rice growers as indicated by the formal standards attained. The scoring pattern followed by Darshan (2018) was followed in the present study:

Category	Score
Illiterate	0
Can read and write	1
Primary School	2
Middle School	3
High School	4
ITI	5
Higher secondary	6
Diploma	7
Graduation	8
Post graduation	9

3.5.3 Family size

It refers to the number of members living in a family. Measurement and scoring was done using the number of members in a family as criteria and the respondents were grouped into following categories.

Category	No. of members per family
Small family	<5
Medium family	6-8
Big family	>8

3.5.4 Land holding

The extent of land actually possessed by the aromatic black rice growers was recorded and this was converted into standard acres based on Karnataka Land Reforms Act 38 of 1996. According to this act, one acre of garden and wet land was considered equal to 2.5 acres of dry land.

Category	Criteria (acres)
Marginal farmers	< 2.50
Small farmers	2.51 - 5.00
Big farmers	> 5.00

3.5.5 Annual income

It refers to the total income earned by the respondents from both agriculture and other sources in one year as expressed by the respondents in terms of rupees. The annual income denotes the income gained by the respondent from different sources. It was empirically measured by using the procedure followed by Deepak (2003). The total annual income was assessed by asking the respondents total income from agriculture and allied activities and income from other source. The minimum and maximum annual income obtained by the respondents was Rs. 0.88 and Rs. 7.89 lakhs, respectively. The average annual income documented was Rs. 2.36 lakhs.

Category	Criteria (Rs. in lakhs)
Low	< Rs. 1.25
Medium	1.25 - 2.25
High	> 2.50

3.5.6 Fallow period

It refers to the span of period the agricultural land was left uncultivated for the purpose of transitioning from conventional agriculture to organic agriculture. The variable was categorised into three categories *viz.*, short, medium and long fallow period as follows:

Category	Criteria (months)
Short	< 3
Medium	4 - 6
Long	> 6

3.5.7 Organic farming experience

The experience of respondents in organic farming was assessed by asking them to mention since how many years they are practising organic farming. Further, they were categorized into three categories *viz.*, less, moderate and more based on the mean (6.03) and half standard deviation (1.91) as indicated below:

Category	Criteria	Years
Less	<(Mean- ½ SD)	<5.08
Moderate	(Mean± ½ SD)	5.08 - 6.98
More	>(Mean- ½ SD)	>6.98

3.5.8 Livestock possession

The livestock possession was operationalized as number of livestock i.e., bullocks, cows, buffalo, goat, poultry, sheep and pig (local and improved varieties/breeds) owned by the respondent. It was empirically measured by using the procedure followed by Taweer (2019). The scoring followed for the research study is given below :

Sl. No.	Item	Score
1	Possession of one bullock pair (local)	1
2	Possession of one local cow or buffalo	1
3	Possession of one improved cow or one improved buffalo	2
4	Possession of sheep or goat	1
5	Possession of broiler/layers/duck	1

Based on total score obtained, the respondents were grouped into three categories using mean (6.98) and half standard deviation (1.08) as measure of check.

Category	Criteria	Criterion score
Low	<(Mean- ½ SD)	< 6.44
Medium	(Mean± ½ SD)	6.44 - 7.52
High	>(Mean- ½ SD)	> 7.52

3.5.9 Material possession

It refers to the agricultural implements and other materials possessed by the aromatic black rice growers. The scoring pattern as suggested by Hiremath (2000) was followed in the present study.

a) Electronic and home appliances

Item	Radio	T.V.	Two wheeler	Four wheeler	Mixer	Mobile phone	Refrigerator	L.P.G.
Score	1	2	1	4	2	2	4	2

b) Agricultural implements / equipment

Item	MB plough	Wooden plough	Cultivator	Tractor	Pump set	Oil engine	Sprayers	Harrow
Score	1	1	2	4	1	1	1	1

The possible minimum and maximum score one could get was 0 to 30, respectively. Based on the total score obtained by the farmers, they were classified into three categories viz, low, medium and high using mean (12.90) and half standard deviation (2.01) as a measure of check.

Category	**Criteria**	**Score**
Low	<(Mean- ½ SD)	<11.90
Medium	(Mean± ½ SD)	11.90 - 12.90
High	>(Mean- ½ SD)	> 12.90

3.5.10 Crop productivity

Crop productivity was ascertained by enquiring the average grain yield of the aromatic black rice from the last three crops. Based on the information obtained , the crop productivity were categorized into three categories *viz.*, less, moderate and more based on the mean (11.50) and half standard deviation (1.72) as measures to check:

Category	Criteria	Yield (q/acre)
Less	<(Mean- ½ SD)	<10.64
Moderate	(Mean± ½ SD)	10.64 - 12.36
More	>(Mean- ½ SD)	> 12.36

3.5.11 Achievement motivation

It was operationalized as the desire for excellence to attain a sense of personal accomplishment. The achievement motivation scale developed by Singh (1978) was used in the present study. The instrument consisted of six statements and responses were obtained on a three point continuum namely, 'agree', 'undecided', and 'disagree' with score of 3, 2 and 1, respectively. The score of the respondents on their achievement motivation was arrived summing up the weightages of responses for each statement. Thus, the total score for each farmer on his achievement motivation ranged from 6 to 18.

Based on the total score obtained by the respondents on achievement motivation, they were grouped into three categories, according to mean (13.01) and half standard deviation (1.95).

Category	Criteria	Score
Low	<(Mean- ½ SD)	<12.03
Medium	(Mean± ½ SD)	12.03 - 13.99
High	>(Mean- ½ SD)	>13.99

3.5.12 Aspiration

It is defined as the possible goal an individual sets himself in his/her performance. Self-anchoring striving scale developed by Cantrill (1965) was adopted in the study to measure the aspiration. In this technique, the aromatic black rice growers were asked to locate himself or herself in the level of aspiration with reference to future. This ladder consists of ten steps after conveying that top of the ladder represented the best possible life

for him or her and the bottom represented the worst life possible for him/ her. The summation of the ladder steps indicated by the respondent for the three questions was taken as the aspiration score. Theoretically, minimum possible score one could get was 3 and the maximum possible score one could get was 30 in this scale. The respondents were further classified into three categories based on the mean (20.33) and half standard deviation (3.00).

Category	Criteria	Score
Low	<(Mean- ½ SD)	<18.83
Medium	(Mean± ½ SD)	18.83 - 21.83
High	>(Mean- ½ SD)	> 21.83

3.5.13 Management orientation

It is operationally defined as the degree to which the respondent is oriented towards managerial aspects relating to his farm operations comprising of planning, production and marketing functions.

The scale developed by Samanta (1977) was utilized to measure the management orientation. The scale contained 13 items. There were five items each for planning and production and three items for marketing orientation. In each group, positive and negative items were kept mixed with a more or less psychological order of the items. The positive statements were given a score of five for "strongly agree", four for "agree", three for "undecided", two for "disagree" and one for "strongly disagree". In case of negative statements, the scoring strategy was turned reverse. The total score was obtained by summation of scores awarded for each statement based on the response category. The minimum and maximum possible scores ranged from 13 to 65, respectively.

By considering the total score obtained by each respondent, they were divided into three groups *viz.,* low, medium and high based on mean (49.42) and half standard deviation (3.99).

Category	Criteria	Score
Low	< (Mean- ½ SD)	<45.43
Medium	(Mean ± ½ SD)	45.43 - 53.41
High	> (Mean + ½ SD)	> 53.41

3.5.14 Economic motivation

Economic motivation refers to the values or attitude for which the aromatic black rice growers attached greater importance to profit maximization. This was quantified by using the scale developed by Supe (1969). The scale consists of six items, with agree and disagree response to each statement. A score of 2 and 1 was given to 'agree' and 'disagree' responses respectively. The minimum and maximum score one could get was 6 and 12, respectively.

By considering the total score obtained by each respondent, they were divided into three groups as low, medium and high level of economic motivation based on mean (9.50) and half standard deviation (0.70).

Category	Criteria	Score
Low	< (Mean- ½ SD)	<8.80
Medium	(Mean ± ½ SD)	8.80 - 10.02
High	> (Mean + ½ SD)	> 10.02

3.5.15 Risk orientation

Risk orientation refers to the degree to which the aromatic black rice growers were oriented towards encountering risks and uncertainty in practicing new ideas in farming. The scale developed by Supe (1969) was used for the present study. The scoring procedure followed was as follows.

Response	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Score for positive items	5	4	3	2	1
Score for negative item	1	2	3	4	5

The scale consisted of six items. The above scoring pattern was followed for positive and negative items. The scores obtained for all the items by an individual were summed up to get the total score of risk orientation. Thus, the maximum score of an individual could be 30, while minimum could be six. Further, the respondents were grouped into three categories viz., low, medium and high by using mean (20.62) and half standard deviation (1.65) as a measure of check

Category	Criteria	Score
Low	< (Mean- ½ SD)	<18.97
Medium	(Mean ± ½ SD)	18.97 - 22.27
High	> (Mean + ½ SD)	>22.27

3.5.16 Innovative proneness

It refers to the behavior pattern of an individual who has interest and desire to seek changes in the farming and to introduce such changes in the practice, when found practicable and feasible. In this study, farmer's inventive inclination was estimated by utilizing the scale developed by Moulik and Rao (1973). The scale consisted of five statements. Positive statements were assigned score of 5,4,3,2, and 1 for strongly agree, agree, undecided, disagree, and strongly disagree responses, respectively and the scoring for the negative statements was reversed. Based on the total scores obtained by the respondents, they were categorized as low, medium and high based on mean (16.22) and half standard deviation (1.23).

Category	Criteria	Score
Low	< (Mean- ½ SD)	<14.99
Medium	(Mean ± ½ SD)	14.99 - 17.45
High	> (Mean + ½ SD)	>17.45

3.5.17 Mass media exposure

This refers to the exposure of an individual to different mass media and the degree of participation in them. The different mass media sources were listed and the respondents

were asked to indicate to how often they participate in each of these activities. The procedure suggested by Byrareddy (1971) was used in assigning weightages as detailed below. The maximum and minimum score would be eight and zero, respectively.

Sl. No.	Source	Extent of exposure		
		Regularly	Occasionally	Never
1	Reading newspaper	2	1	0
2	Listening to radio	2	1	0
3	Reading farm magazine	2	1	0
4	Watching Krishidarshan in TV	2	1	0

Based on the total score, the aromatic black rice growers were categorized into low, medium and high mass media exposure using mean (4.00) and half standard deviation (0.49).

Category	Criteria	Score
Low	< (Mean- ½ SD)	<3.51
Medium	(Mean ± ½ SD)	3.51 to 4.49
High	> (Mean + ½ SD)	>4.49

3.5.18 Training on organic farming

It refers to the number of trainings on organic farming the respondents had undergone. For each training attended by the respondent one score was given. The aromatic black rice growers were classified into low, medium and high level of training considering mean (1.60) and half standard deviation (0.52) as measures of check.

Category	Criteria	Score
Low	< (Mean- ½ SD)	<1.08
Medium	(Mean ± ½ SD)	1.08 to 2.12
High	> (Mean + ½ SD)	>2.12

3.5.19 Extension agency contact

It refers to the frequency of consultation of the respondent with the extension personnel involved in MOVCDS *viz.,* Assistant Agriculture Officer, Agriculture Development Officer, technical staff of Manipur Organic Mission Agency, Non-governmental organisation etc., to get information on organic rice farming practices and also to obtain information on the MOVCDS activities. Scoring for this variable was followed as per the procedure followed by Byrareddy (1971). The designation of extension functionaries available in the study area were listed and the respondents were asked to indicate their frequency of contact to obtain the information. The minimum and maximum score one could get was 0 and 18, respectively. The scoring procedure adopted in the research study is as follows:

Sl. No.	Extension personnel	Frequency of contact			
		Often	Sometimes	Rarely	Never
1	Agricultural Development officer	3	2	1	0
2	Assistant Agricultural officer	3	2	1	0
3	Agricultural technological manager /Block technological manager	3	2	1	0
4	Technical staff of Manipur Organic Mission Agency	3	2	1	0
5	Non-governmental organization	3	2	1	0
6	Others (specify)	3	2	1	0

Based on the scores obtained, the respondents were grouped into three categories using mean (13.87) and half standard deviation (1.38) as a measure of check.

Category	Criteria	Score
Low	< (Mean- ½ SD)	<12.49
Medium	(Mean ± ½ SD)	12.49 to 15.25
High	> (Mean + ½ SD)	>15.25

3.5.20 Extension participation

It refers to the extent of participation of the respondent in different extension activities organised under MOVCDS to the beneficiary aromatic black rice growers. The variable is quantified by the procedure followed by Trivedi (1963). The extension activities were listed and respondents were asked to indicate their level of participation in each activity. The maximum score of 12 and minimum score of zero could be obtained by the respondents. The scoring procedure adopted in the study is as follows:

Sl. No.	Activities	Response category		
		Regularly	Occasionally	Never
1	Group meetings	2	1	0
2	Seminars/talks	2	1	0
3	Demonstrations	2	1	0
4	Krishimela/exhibitions	2	1	0
5	Field day / visits	2	1	0
6	Training	2	1	0

Based on the scores obtained, the respondents were grouped into three categories using mean (8.24) and half standard deviation (0.75) as measures of check.

Category	Criteria	Score
Low	< (Mean- ½ SD)	<7.49
Medium	(Mean ± ½ SD)	7.49 - 8.99
High	> (Mean + ½ SD)	>8.99

3.6 Impact of Mission Organic Value Chain Development Scheme on crop yield and income of aromatic black rice growers

Information with respect to grain (q/acre) and straw (t/acre) yield of the previous three rice crops were obtained from the aromatic black rice growers after they joined the

scheme. The grain and straw yield obtained by the aromatic black rice growers before joining the scheme was also documented to compare the crop yield obtained before and after joining the MOVCDS to know the impact of MOVCS on crop yield. The gross and net income was also documented to compare the income obtained before and after joining the MOVCDS by the aromatic black rice growers.

3.7 Documentation of case studies of successful aromatic black rice growers

Case study is a method of exploring and analyzing the life of social unit *i.e.*, a person, a family, an institution or a community is known as the case study method. The case study is often termed as a method, a technique and an approach, to understand the social reality and a mode of organizing data in terms of some chosen units. It is in fact a technique which considers all pertinent aspects of the situations, employed as a unit for study of an individual or group intensively investigating it. It examines the complex situations in identifying the casual factors operating. In the present investigation, four successful aromatic black rice growers who had got increased crop yield and income by adopting the organic farming practices advocated under MOVCDS were interviewed.

3.8 Problems faced by the aromatic black rice growers in Mission Organic Value Chain Development Scheme

The respondents were asked to mention the problems encountered by them in MOVCDS. The problems recorded are presented in frequency and percentage. The rank was assigned depending upon the percentage obtained for each problem.

3.9 Suggestion of aromatic black rice growers to overcome the problems in Mission Organic Value Chain Development Scheme

The suggestions expressed by the aromatic black rice growers to overcome the problems faced by them in MOVCDS are presented in terms of frequency, percentage and ranks.

3.10 Development of interview schedule

Taking into the consideration the objectives of the study, an interview schedule was prepared after perusal of available literature and thorough consultation with the social scientists and officials of MOVCDS. Each question was improved for its relevance and meaning by constant interaction with the expert in the area. The schedule was pre tested to incorporate necessary changes. The final schedule (Appendix-II) was used for collecting the required information from the aromatic black rice growers.

3.11 Data collection

Three preliminary visits were undertaken by the researcher to the study area to get acquaintance with the aromatic black rice growers, which helped to get reliable and accurate information about MOVCDS. Data were collected from 180 aromatic black rice growers during the months of March and April, 2021.

The personal interview was conducted under informal atmosphere. Each question was explained to the respondents and an equal emphasis was given in explaining all the respondents interviewed. The onlooker's influence was avoided to a considerable extent throughout the study. The informal discussion and observations were also held to understand the respondents and the situation in detail, which in turn was helpful in better interpretation of the results.

3.12 Analysis of data

The collected data were scored, quantified and analyzed using mean, frequency, percentage, standard deviation, student 't' test, chi-square test, multiple regression analysis and path analysis.

3.12.1 Mean

It is the sum of the observed values of a set divided by the number of observations in the set is called a mean or an average. The calculated mean was used for grouping the respondents.

3.12.2 Standard deviation

The positive square root of the variance is called as standard deviation. It explains the average amount of variation on either side of the mean. The mean and standard deviation were used to classify the respondents into three following categories viz., low, medium and high level.

3.12.3 Student ‘t’ test

This test was used to find out the impact of MOVCDS on the crop yield and income of the aromatic black rice growers. The grain and straw yield as well as income obtained by the respondents before and after joining the MOVCDS is compared to know the impact of MOVCDS on crop yield and income of the aromatic black rice growers.

3.12.4 Chi-Square test

The chi-square test was employed to find out the association between the profile (independent variables) of aromatic black rice growers with their perception towards MOVCDS, knowledge regarding the benefits provided under MOVCDS and adoption of organic farming practices (dependent variables).

3.12.5 Multiple regression analysis

It was used to know the extent of combined contribution of independent variables (profile of aromatic black rice growers) on dependent variables (perception towards MOVCDS, knowledge regarding the benefits provided under MOVCDS and adoption of organic farming practices.)

3.12.6 Path analysis

It was used to find out the direct, indirect and largest direct effects of profile characteristics of aromatic black rice growers on the dependent variables (perception, knowledge and adoption level).

Plate 1: A view of aromatic black rice field

Plate 2: Data collection by the researcher

Plate 3 and 4: Data collection by the researcher

3.13 Conceptual model of the study

Conceptual model is a diagrammatic representation outlining the dominant elements of a system and their inter relationships with respect to criterion variable (Anon, 1977). Conceptual model is formulated on the basis of experience or intuition. It represents the researcher understating of particular set of circumstances and of the simplifications which he/she feels may be made to inherently complex relationships. In the present study, in addition to experience and intuition, review of related studies was also formed the basis for the conceptual model developed for the study. The variables included in the study were classified as dependent and independent variables.

Independent variables are conceived as those which precede the others in the order of time and which theoretically expected to lead or to be followed by certain other variables. In the present study, profile characteristics of aromatic black rice growers were considered as independent variables.

Dependent variable is the one that is being predicted from independent variables. In the present study, the perception of aromatic black rice growers towards MOVCD, knowledge of aromatic black rice growers regarding the benefits provided under the MOVCDS and adoption of organic farming practices by the respondents were considered as dependent variables. The conceptual model of the research study is presented as Fig. 2.

Fig. 2: Conceptual model of the study showing the association between independent variables and dependent variables

IV RESULTS AND DISCUSSION

In this chapter, the results based on the research data of the present study are documented and discussed. Keeping the objectives in view, data were tabulated and analysed with suitable statistical tools. The research findings are presented under the following headings:

4.1. Profile characteristics of aromatic black rice growers

4.2. Perception of aromatic black rice growers towards Mission Organic Value Chain Development Scheme

4.3. Knowledge of aromatic black rice growers regarding the benefits provided under Mission Organic Value Chain Development Scheme

4.4. Adoption of organic farming practices by aromatic black rice growers

4.5. Impact of Mission Organic Value Chain Development Scheme on crop yield and income of aromatic black rice growers

4.6. Association between dependent variables

4.7. Association between profile characteristics of aromatic black rice growers with their perception, knowledge and adoption level

4.8. Extent of contribution of profile characteristics of aromatic black rice growers on the perception, knowledge and adoption level

4.9. Direct, indirect and largest indirect effects of profile characteristics of aromatic black rice growers on the perception, knowledge and adoption level

4.10. Documentation of case studies of successful aromatic black rice growers

4.11. Problems faced by aromatic black rice growers in Mission Organic Value Chain Development Scheme

4.12. Suggestions of aromatic black rice growers for the effective implementation of Mission Organic Value Chain Development Scheme

4.1. Profile characteristics of aromatic black rice growers

Table 1 presents the data on the profile characteristics of aromatic black rice growers.

The results in Table 1 reveals that majority of the aromatic black rice growers belong to the middle age group (64.44%), while less than one-third of the aromatic black rice growers belonged to the old age category (31.11%) followed by 4.44 per cent of them belonging to the young age category. Table 1 also reveals that 10.55 per cent of the sampled respondents were illiterate, while 17.22, 10.55, 8.33 and 12.22 per cent of the sampled respondents could be able to read and write, studied upto primary school, middle, school and high school, respectively. Further, 5.55, 8.88, 9.44, 13.93 and 3.33 per cent of the sampled respondents had studies upto ITI, higher secondary, diploma, graduation and post-graduation, respectively.

A perusal of Table 1 reveals that a larger number of the aromatic black rice growers were having small family (46.67%), while 42.22 of them were having medium size family and the remaining 11.11 per cent of the aromatic black rice growers were having large size family, respectively. Almost half of the aromatic black rice growers sampled were marginal famers (48.89%), whereas 42.22 and 8.89 per cent of the aromatic black rice growers sampled were small and large farmers, respectively.

Forty per cent of the aromatic black rice growers were belonging to the lower income category, while 26.67 per cent were belonging to medium income category and the remaining one-third (33.33%) of the aromatic black rice growers were belonging to higher income category (Table 1). Majority of the aromatic black rice growers (58.34%) had kept their land on a longer fallow period of more than 6 months., while a little more than two-fifth (22.22%) of the respondents had kept their land on a shorter fallow period of up to 3 months and the remaining 19.44 per cent had kept their land on a medium duration of fallow period (4 to 6 months).

It could be seen from Table 1 that a little less than three-fourth of the aromatic black rice growers had moderate level of organic farming experience (74.45 %), while 20.00 and

Table 1: Profile characteristics of aromatic black rice growers (n=180)

Sl. No.	Characteristics	Category	Aromatic black rice growers	
			No.	%
1.	Age	Young (upto 35 years)	8	4.44
		Middle (36-50 years)	116	64.44
		Old (>50 years)	56	31.11
2.	Education	Illiterate	19	10.55
		Can read and write	31	17.22
		Primary school	19	10.55
		Middle school	15	8.33
		High school	22	12.22
		ITI	10	5.55
		Higher secondary	16	8.88
		Diploma	17	9.44
		Graduation	25	13.93
		Post-graduation	6	3.33
3.	Family size (members per family)	Small (upto 5)	84	46.67
		Medium (6-8)	76	42.22
		Large (>8)	20	11.11
4.	Land holding (acre)	Marginal farmer (< 2.5)	88	48.89
		Small farmer (2.5-5.0)	76	42.22
		Large farmer (> 5.0)	16	8.89
5.	Annual income (Rs in lakhs)	Low (upto 1.25)	72	40.00
		Medium (1.25 - 2.50)	48	26.67
		High (more than 2.50)	60	33.33
6.	Fallow period (months)	Short (< 3)	40	22.22
		Medium (4 - 6)	35	19.44
		Long (> 6)	105	58.34
7.	Organic farming experience (years) Mean: 6.03 SD: 1.91	Less (<5.80)	10	5.55
		Moderate (5.08-6.98)	134	74.45
		More (> 6.98)	36	20.00
8.	Livestock possession (score) Mean: 6.98 SD: 1.08	Low (<6.44)	48	26.67
		Medium (6.44-7.52)	76	42.22
		High (>7.52)	56	31.11
9.	Material possession (score) Mean: 12.90 SD: 2.01	Low (<11.90)	60	33.33
		Medium (11.90-12.90)	84	46.67
		High (>12.90)	36	20.00

Sl. No.	Characteristics	Category	Aromatic black rice growers	
			No.	%
10.	Crop productivity (q/acre) Mean: 11.50 SD : 1.72	Low (<10.64)	42	23.34
		Medium (10.64-12.36)	66	36.66
		High (>12.36)	72	40.00
11.	Achievement motivation (score) Mean: 13.01 SD: 1.95	Low (<12.03)	64	35.56
		Medium (12.03-13.99)	40	22.22
		High (>13.99)	76	42.22
12.	Aspiration (score) Mean: 20.33 SD: 3.00	Low (<18.33)	60	33.33
		Medium (18.33-21.83)	40	22.22
		High (>21.83)	80	44.44
13.	Management orientation (score) Mean: 49.42 SD: 7.98	Low (<45.83)	64	35.56
		Medium (45.83-52.91)	52	28.88
		High (>52.91)	64	35.56
14.	Economic motivation (score) Mean: 9.50 SD: 1.40	Low (<8.80)	36	20.00
		Medium (8.80-10.02)	80	44.44
		High (>10.02)	64	35.56
15.	Risk orientation (score) Mean: 20.62 SD: 3.10	Low (<18.97)	36	20.00
		Medium (18.97-22.27)	88	48.89
		High (>22.27)	56	31.11
16.	Innovative proneness (score) Mean: 16.22 SD: 2.46	Low (<14.99)	36	20.00
		Medium (14.99-17.45)	68	37.78
		High (>17.45)	76	42.22
17.	Mass media exposure (score) Mean: 4.00 SD: 0.99	Low (< 3.51)	40	22.22
		Medium (3.51 – 4.49)	76	42.22
		High (>4.49)	64	35.56
18.	Training on organic farming (score) Mean: 1.60 SD: 0.50	Low (< 1.08)	24	13.33
		Moderate (1.08-2.12)	96	53.34
		More (> 2.12)	60	33.33
19.	Extension agency contact (score) Mean: 13.87 SD: 2.77	Low (<12.49)	32	17.78
		Medium (12.49-15.25)	76	42.22
		High (> 15.25)	72	40.00
20.	Extension participation (score) Mean: 8.24 SD: 1.50	Low (< 7.49)	55	30.55
		Medium (7.49- 8.99)	48	26.67
		High (> 8.99)	77	42.78

SD = Standard deviation

5.55 per cent of the respondents had more and less organic farming experience, respectively. The study results also revealed that more number of aromatic black rice growers were belonging to medium category of livestock possession (42.22%), followed by 31.11 per cent of the aromatic black rice growers were belonging to the high category of livestock possession and 26.67 per cent of them were belonging to low category of livestock possession.

As high as 46.67 per cent of the aromatic black rice growers belonged to the medium category of material possessions, while one-fifth (20.00%) of the respondents belonged to the high material possession category and the remaining one-third (33.33%) were belonging to low category of material possession (Table 1). The findings revealed that 40.00 per cent of the aromatic black rice growers had obtained high crop productivity followed by 36.66 per cent and less than one-fourth (23.34%) of the respondents had obtained medium and low crop productivity, respectively.

A perusal of Table 1 reveals that 42.22 per cent of the aromatic black rice growers had high level of achievement motivation, while 35.56 and 22.22 per cent of the respondents had low and medium level of achievement motivation, respectively. The results in Table 1`also reveals that a large proportion of the aromatic black rice growers (44.44%) were found to be having high level of aspiration followed by one-third (33.33%) and 22.22 per cent of the respondents having low and medium level of aspiration, respectively.

It was found from the results in Table 1 that an equal number of the aromatic black rice growers (35.56% each) were belonging to low and high management orientation category, while 28.88 per cent of the aromatic black rice growers were belonging to the medium category of management orientation. As high as 44.44 per cent of the aromatic rice growers had medium level of economic motivation followed by 35.56 per cent of the respondents were having high level of economic motivation and the remaining one-fifth (20.00%) of the respondents were having low level of economic motivation.

A bird's eye view of the Table 1 reveals that a large number of the aromatic black rice growers (48.89 %) had medium level of risk orientation. On the other hand, 31.11 per cent of the growers were found to be in the high category of risk orientation followed by 20.00 per cent of them were found to be in low category of risk orientation. As high as 42.22 per cent of the aromatic black rice growers had high level of innovative proneness, whereas 37.78 per cent of them had medium level of innovative proneness and the remaining 20.00 per cent of the aromatic black rice growers were having low level of innovative proneness.

Table 1 reveals that 42.22 per cent of the aromatic black rice growers had medium level of mass media exposure, whereas 35.56 and 22.22 per cent of the aromatic black rice growers were belonging to the high and low category of mass media exposure, respectively. Over half the aromatic black rice growers (53.34%) were belonging to medium category of training on organic farming, while one-third (33.33%) and 13.33 per cent of the aromatic black rice growers were belonging to high and low category of training on organic farming, respectively.

As high as 42.22 per cent of the aromatic black rice growers had medium level of extension agency contact, while 40.00 and 17.78 per cent of the aromatic black rice growers were having high and low level of extension agency contact, respectively. More number of aromatic black rice growers were having high level of extension participation (42.78%), followed by 30.55 and 26.67 per cent of the aromatic black rice growers belonging to low and medium level of extension participation, respectively.

It could be inferred from the profile characteristics of the aromatic black rice growers, that a larger proportion of the aromatic rice growers were of middle age (64.44%), marginal farmers (48.89%) having small family (46.67%) and low level of annual income (40.00%). More number of aromatic black rice could be able to read and write (17.22%). Majority of the aromatic black rice growers had kept their land follow for long period (58.34%) and were having moderate organic farming experience (74.45%). More number of aromatic rice growers were belonging to medium/moderate level of livestock possession (42.22%), material possession (46.67%), economic motivation (44.44%), risk orientation

(48.89%), mass media exposure (42.22%) and training on organic farming (44.44%). As high as 40.00 per cent of the aromatic black rice growers had obtained high level of crop productivity, while an equal number of aromatic black rice growers (35.56% each) were having low and high level of management orientation. A larger number of aromatic black rice growers were belonging to high level of achievement motivation (42.22%), aspiration (44.43%), innovative proneness (42.22%), extension agency contact (40.00%) and extension participation (42.78%). The findings of the present research are in line with the findings of Senthil (2009), Prashanth (2011), Babu (2017), Punitha (2017), Bharath Kumar (2018), Jyothi and Devarani (2019), Tanweer (2019) and Chaitra (2020).

4.2. Perception of aromatic black rice growers towards Mission Organic Value Chain Development Scheme

The present section deals with the statement-wise perception of aromatic black rice growers towards production, supporting and processing components towards Manipur Organic Value Chain Development Scheme (MOVCDS) and the overall perception of aromatic black rice growers towards MOVCDS.

4.2.1 Statement-wise perception of aromatic black rice growers towards Mission Organic Value Chain Development Scheme

The statement-wise perception of aromatic black rice growers towards MOVCDS are presented in Table 2. With respect to the production component, a vast majority of the aromatic black rice growers (83.33%) had ‘strongly agreed’ to the positive statement ‘MOVCDS aims at development of certified organic production in a value chain mode’.

Whereas, majority of the aromatic black rice growers had ‘strongly disagreed’ to the negative statements such as : (a) More number of black rice growers have shifted from organic to chemical farming after the implementation of MOVCDS (82.22%), (b) crop planning and time management are not followed effectively by black rice growers by participating in the value chain activities of MOVCDS (80.55%), (c) MOVCDS facilitate farmers with untimely supply of quality seeds (70.56%), (d) MOVCDS is emphasizing the farmers to use less of organic manure to black rice (73.33%) and, (e) MOVCDS is advocating excessive use of inorganic fertilizers to black rice (78.33%).

Table 2: Statement-wise perception of aromatic black rice growers towards MOVCDS (n=180)

Sl. No.	Perception statements	Aromatic black rice growers				
		Strongly agree	Agree	Un-decided	Disagree	Strongly disagree
A.	Production component					
1	MOVCDS aims at development of certified organic production in a value chain mode	150 (83.33)	26 (14.46)	2 (1.11)	1 (0.55)	1 (0.55)
2	More number of black rice growers have shifted from organic to chemical farming after the implementation of MOVCDS	0 (0.00)	0 (0.00)	0 (0.00)	32 (17.7)	148 (82.22)
3	Crop planning and time management are not followed effectively by black rice growers by participating in the value chain activities of MOVCDS	0 (0.00)	0 (0.00)	0 (0.00)	35 (19.45)	145 (80.55)
4	MOVCDS facilitate farmers with untimely supply of quality seeds	1 (0.55)	2 (1.11)	0 (0.00)	47 (26.11)	130 (70.56)
5	MOVCDS is emphasizing the farmers to use less of organic manure to black rice	0 (0.00)	0 (0.00)	0 (0.00)	48 (26.67)	132 (73.33)
6	MOVCDS is advocating excessive use of inorganic fertilizers to black rice	0 (0.00)	0 (0.00)	0 (0.00)	40 (21.67)	141 (78.33)
B.	Supporting component					
7	MOVCDS empowers black rice growers with programme ownership by organizing them into Farmers Interest Groups (FIGs) at village level and federated into Farmers Producers Companies (FPCs) at District level	142 (78.88)	34 (18.91)	2 (1.11)	1 (0.55)	1 (0.55)
8	Farmers cluster provides an opportunity for its members to develop leadership qualities	120 (66.60)	43 (23.88)	7 (3.91)	4 (2.22)	6 (3.33)
9	Farmers clusters has not provided platform for sharing experience among the members	1 (0.55)	1 (0.55)	6 (3.33)	26 (14.46)	146 (81.11)
10	MOVCDS develops rice production clusters with necessary infrastructural, technical and financial support	144 (80.00)	32 (17.79)	2 (1.11)	1 (0.55)	1 (0.55)

Sl. No.	Perception statements	Aromatic black rice growers				
		Strongly agree	Agree	Un-decided	Disagree	Strongly disagree
11	Participating in value chain activities of MOVCDS has not helped the black rice growers to have strong research and extension linkages	2 (1.11)	2 (1.11)	5 (2.77)	41 (22.79)	130 (72.22)
12	Outreach activities (demonstrations, training, field visits, field days etc.) of MOVCDS has increased the adoption of more organic farming practices	129 (71.66)	49 (27.24)	1 (0.55)	0 (0.00)	1 (0.55)
C.	Processing and marketing component					
13	Organic bazaars are established to function as collection centers between the farm gate and processing infrastructures	8 (4.44)	10 (5.56)	12 (6.67)	36 (20.00)	114 (63.33)
14	MOVCDS facilitates partnerships and trade relations between FPCs and organic businesses for promoting domestic and exports markets	76 (42.22)	54 (30.00)	22 (12.22)	12 (6.67)	16 (8.89)
15	MOVCDS has created awareness among public by giving wide publicity through printed literature, films and local advertisements for promoting the sale of organic black rice	129 (71.66)	49 (27.24)	1 (0.55)	0 (0.00)	1 (0.55)
16	MOVCDS markets the organic produce through direct retail, farmer markets, on-line chain and tying up with domestic retail chains and exporters	86 (47.78)	60 (33.33)	20 (11.11)	8 (4.44)	6 (3.33)
17	MOVCDS has organized Trade fairs/organic festivals for effective marketing of organic black rice among trading fraternity and value chain operators	139 (77.22)	32 (17.79)	6 (3.33)	1 (0.55)	2 (1.11)
18	MOVCDS enables Manipur to evolve its own brand for organic black rice	146 (81.13)	26 (14.44)	5 (2.77)	2 (1.11)	1 (0.55)

Figure in parenthesis indicates percentage

In the respect of supporting component, more than two-thirds of the respondents had 'strongly agreed' for the positive statements: (a) MOVCDS develops rice production clusters with necessary infrastructural, technical and financial support (80.00%), (b) MOVCDS empowers black rice growers with programme ownership by organizing them into farmers interest groups at village level and federated into farmers producers companies at district level (78.88%), (c) outreach activities (demonstrations, training, field visits, field days, etc.) of MOVCDS has increased the adoption of more organic farming practices (71.66%), and (d) farmers cluster provides an opportunity for its members to develop leadership qualities (66.60%). While, majority of the aromatic black rice growers had 'strongly disagreed' for the negative statements like: (a) farmers clusters has not provided platform for sharing experience among the members (81.11%), and (b) participating in value chain activities of MOVCDS has not helped the black rice growers to have strong research and extension linkages (72.22%).

With regard to the processing and marketing component, a majority of the aromatic black rice growers had 'strongly agreed' for the positive statements: (a) MOVCDS enables Manipur to evolve its own brand for organic black rice (81.13%), (b) MOVCDS has organized trade fairs/organic festivals for effective marketing of organic black rice among trading fraternity and value chain operators (77.22%), and (c) MOVCDS has created awareness among the public by giving wide publicity through printed literature, films and local advertisements for promoting the sale of organic black rice (71.66%). It was very interesting to note that less than half of the aromatic black rice growers had 'strongly agreed' for the positive statements viz., (a) MOVCDS markets the organic produce through direct retail, farmer markets, on-line chain and tying up with domestic retail chains and exporters (47.78%), and (b) MOVCDS facilitates partnerships and trade relations between farmers producers companies and organic businesses for promoting domestic and exports markets (42.22%). It was also observed from Table 2 that a majority of aromatic black rice growers had 'strongly disagreed' for the negative statement, organic bazaars serve as collection centre from farm gate to the processing infrastructures (63.33%)'.

It could be observed from the above results that an overwhelming number of the aromatic black rice growers had 'strongly agreed' for almost all the positive perception

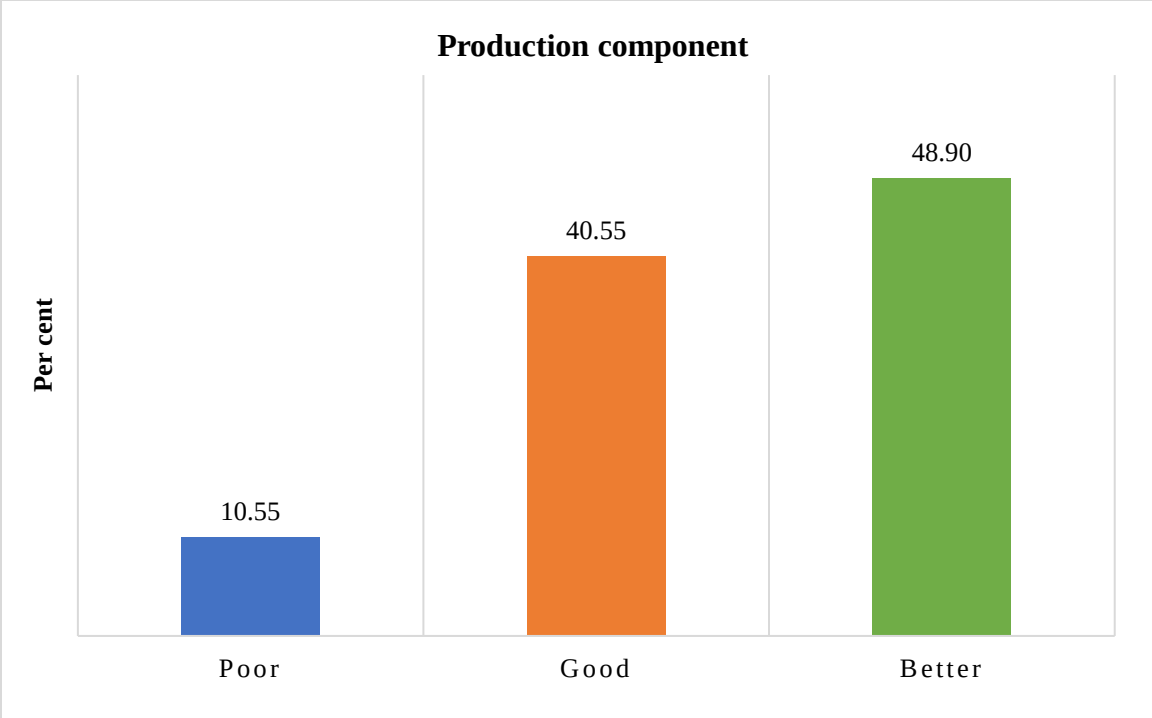

Fig. 3: Perception of aromatic black rice growers towards production component of MOVCDS

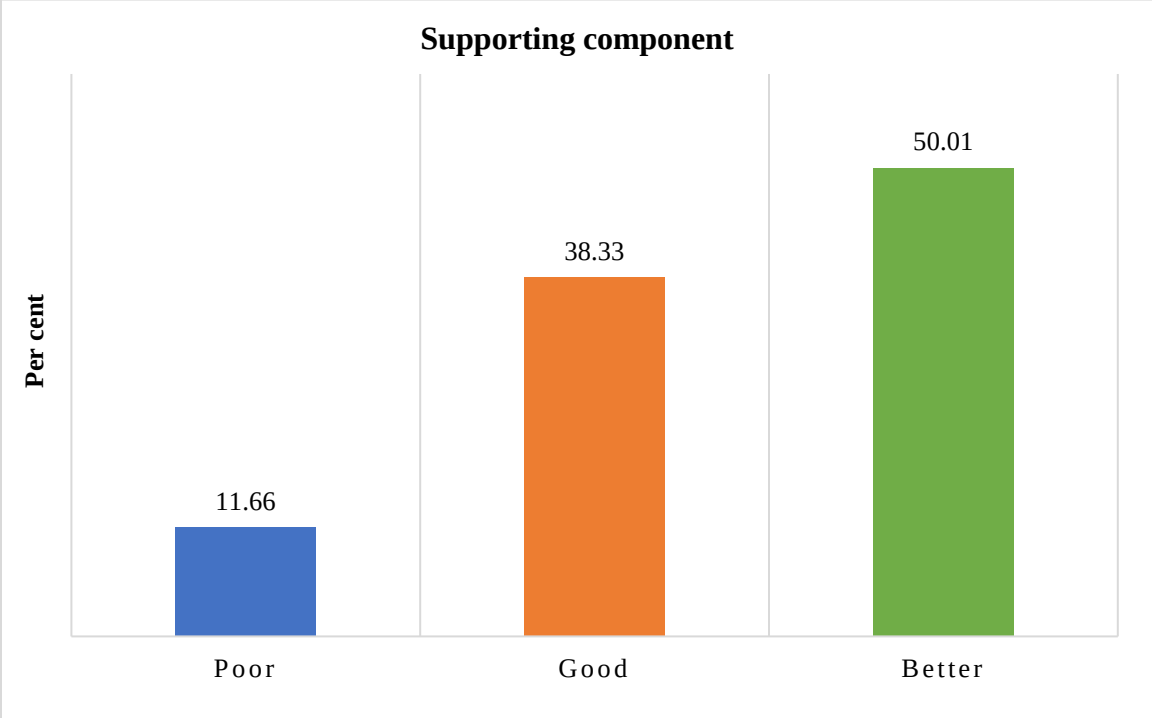

Fig. 4: Perception of aromatic black rice growers towards supporting component of MOVCDS

statements and ‘strongly disagreed’ for all the negative perception statements. It could be inferred from the above results that aromatic black rice growers had better perception towards value chain activities of production, supporting and processing and marketing components of MOVCDS.

4.2.2 Overall perception of aromatic black rice growers towards Manipur Organic Value Chain Development Scheme

The results in Table 3 presents the data on the overall perception of aromatic black rice growers towards MOVCDS. The findings in Table 3 and Fig. 3 reveals that a larger number of aromatic black rice growers (48.90%) had better perception towards the production component of MOVCDS, whereas 40.55 and 10.55 per cent of the aromatic black rice growers had good and poor perception towards the production components of MOVCDS, respectively. It is evident from the research results that an overwhelming number of aromatic black rice growers (89.45%) had good to better perception towards the production component of MOVCDS. The scheme has advocated the farmers to follow crop planning and time management, facilitated farmers in providing timely supply of quality seeds, emphasized the minimum use and maximum use of inorganic manure (fertilizer) and organic manure, and MOVCDS had aimed at development of certified organic production in a value chain mode, hence an overwhelming number of aromatic black rice growers (89.45%) had good to better perception towards the production component of MOVCDS.

Table 3 and Fig. 4 reveals that a little over half of the aromatic black rice growers (50.01%) had better perception towards the supporting component of MOVCDS followed by 38.33 and 11.66 per cent of them having good and poor perception towards the supporting component of MOVCDS, respectively. It could be interpreted that a greater majority of aromatic black rice growers (88.34%) had good and poor perception towards the supporting component of MOVCDS. The scheme has empowered the respondents through the programme ownership, developed leadership qualities, and provided the platform for sharing experiences by organizing them into farmers interest groups at the village level and federated into farmers producers companies at the district level, developed rice production clusters with necessary infrastructural, technical and financial support and

also the scheme had organised a good number of outreach activities for dissemination of organic rice farming practices, therefore a greater majority of aromatic black rice growers (88.34%) had good and poor perception towards the supporting component of MOVCDS.

A little over one-third of the aromatic black rice growers were having better perception (33.90%) towards the processing and marketing component of MOVCDS, while one-third of the respondents were having poor perception (33.33%) and the remaining respondents were having good perception (32.77%) towards the processing and marketing component of MOVCDS (Table 3 and Fig. 5). Under the scheme, awareness was created among the public by giving wider publicity for promoting the sale of organic black rice, organised trade fairs/organic festivals, and had enabled Manipur to evolve its own brand for organic black rice, as a result, 33.90 per cent and 32.77 per cent of the aromatic black rice growers were having better and good perception towards MOVCDS, respectively. While, one-third of the aromatic black rice growers (33.33%) had poor perception towards MOVCDS, because the scheme had often failed in developing the partnerships and trade relations between farmers producers companies and organic businesses for promoting domestic and exports markets.

Table 3: Overall perception of aromatic black rice growers towards different components of MOVCDS (n=180)

Sl. No.	MOVCDS components	Overall perception category						Mean	SD
		Poor		Good		Better			
		No.	%	No.	%	No.	%		
1	Production component	19	10.55	75	40.55	88	48.90	16.61	2.49
2	Supporting component	21	11.66	69	38.33	90	50.01	16.72	2.60
3	Processing and marketing component	60	33.33	59	32.77	61	33.90	12.09	2.00
	Overall perception	33	18.33	67	37.22	80	44.45	45.42	7.09

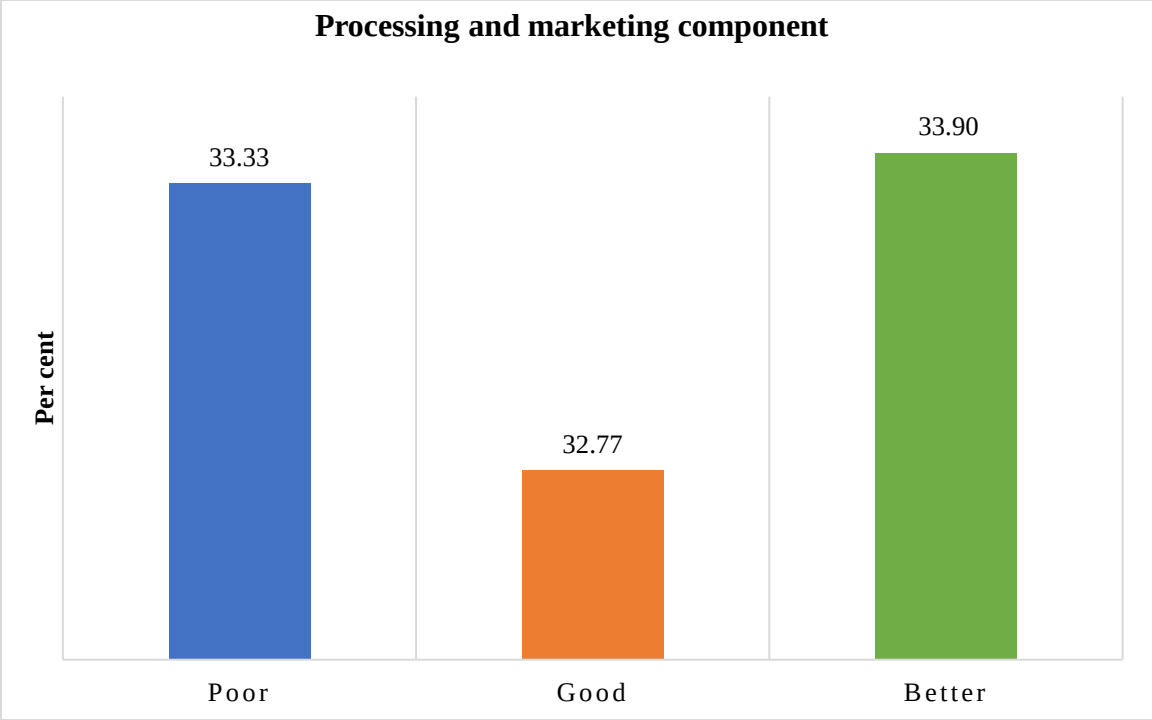

Fig. 5: Perception of aromatic black rice growers towards processing and marketing component of MOVCDS

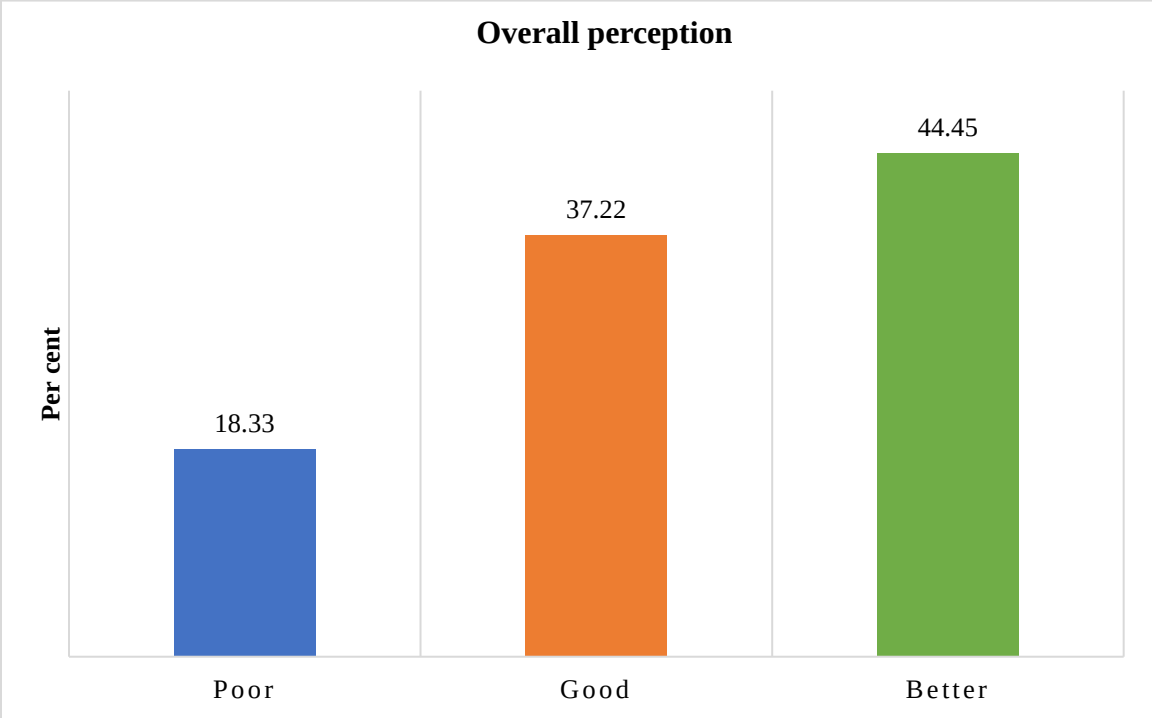

Fig. 6: Overall perception of aromatic black rice growers towards MOVCDS

It is observed in Table 3 and Fig. 6 that in respect of the overall perception towards MOVCDS, a greater proportion of the aromatic black rice growers (44.45%) were having better overall perception, category, whereas more than one-third (37.22%) and 18.33 per cent of them had good and poor perception towards MOVCDS. As high as 81.67 per cent of the aromatic black rice growers had good to better perception towards MOVCDS. Organizing farmers into farmer interest groups, timely availability of organic inputs, effective crop planning, accessibility of agricultural extension personnel and service providers, participating regularly in extension activities of MOVCDS, etc., are the reasons for a vast majority (81.67%) of the aromatic black rice growers having good to better overall perception towards MOVCDS. On the other hand, aromatic black rice growers perceived the scheme has failed in executing the activities like organising farm bazaars and linking farmers with market, hence 18. 33 per cent of the respondents had poor overall perception towards MOVCDS. The findings are ably supported by the findings of Duhan (2017), Preethi (2015), and Philip and Sivaraj (2018).

The study results revealed that there were differences in the level of perception amongst the aromatic black rice growers, hence the null hypothesis 'there is no difference in the perception level among the aromatic black rice growers towards MOVCDS', is rejected.

4.3. Knowledge of aromatic black rice growers regarding the benefits provided under Mission Organic Value Chain Development Scheme

This section deals with the knowledge of aromatic black rice growers regarding the specific benefits provided under MOVCDS and the overall knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS.

4.3.1 Knowledge of aromatic black rice growers regarding the specific benefits provided under MOVCDS

The findings in Table 4 revealed that a vast majority of aromatic black rice growers were possessing correct knowledge on the knowledge items such as: farmers were provided with the quality seed/ planting material as assistance for the first two years of establishment (99.45%), the scheme has enabled the beneficiaries to sell their produces under the brand

Table 4: Knowledge of aromatic black rice growers regarding the specific benefits provided under MOVCDS (n=180)

Sl. No.	Particulars	Aromatic black rice growers			
		Correct knowledge		Incorrect knowledge	
		No.	%	No.	%
1	An assistance of Rs. 3750 per ha could be availed for the establishment of on-farm input production unit.	172	95.55	8	4.45
2	One-time assistance of Rs. 3750 per ha area could be procured by the farmers in the first year for procurement of off-farm inputs such as biofertilizers, biopesticides and neem cake	168	93.33	12	6.67
3	Farmers are provided with the quality seed/ planting material as assistance for the first two years of establishment	179	99.45	1	0.55
4	Assistance for quality seed/ planting material through the MOVCDS is limited to 50% of actual seed/ planting material cost (limited to Rs17500/ha)	171	95.00	9	5.00
5	Resource sharing is facilitated among registered Black rice growers in farmers interest groups	168	93.33	12	6.67
6	Collection of produce is endured by service providers for the sale of the produce	169	93.88	11	6.12
7	Timely logistic support in terms of aggregation and transportation of organic black rice is provided under MOVCDS	160	88.88	20	11.12
8	Agri-machinery custom hiring centers are established to cater the needs of Black rice growers	159	88.33	21	11.67
9	Storage chambers for storing crop harvest have been established at each district	167	92.77	13	7.23
10	Effective integrated pack house is established as subsidiary component of collection, aggregation and grading units and integrated processing units	160	88.88	20	11.12
11	A three-year organic scope certification is being carried out under MOVCDS to help certify the produces	161	89.44	19	10.56
12	Marketing infrastructure are established within the radius of 25 km from farmers clusters to increase access to market	160	88.88	20	11.12
13	The scheme enables the beneficiaries to sale their produces under the brand name “Organic Manipur”	179	99.45	1	0.55

name “Organic Manipur” (99.45%), an assistance of Rs. 3750 per ha could be availed for the establishment of on-farm input production unit (95.55%), assistance for quality seed/ planting material through the MOVCDS is limited to 50.00 per cent of actual seed/ planting material cost (limited to Rs17500/ha) (95.00%), collection of produce is endured by service providers for the sale of the produce (93.88%), one-time assistance of Rs. 3750 per ha area could be procured by the farmers in the first year for procurement of off-farm inputs such as biofertilizers, biopesticides and neem cake (93.33%) resource sharing is facilitated among registered black rice growers in farmers interest groups (93.33%), storage chambers for storing crop harvest have been established at each district (92.77%), a three-year organic scope certification is being carried out under MOVCDS to help certify the produces (89.44%), timely logistic support in terms of aggregation and transportation of organic black rice is provided under MOVCDS (88.88%), effective integrated pack house is established as subsidiary component of collection, aggregation and grading units and integrated processing units (88.88%), marketing infrastructure are established within the radius of 25 km from farmers clusters to increase access to market (88.88%) and agri-machinery custom hiring centres are established to cater the needs of black rice growers (88.33%).

Regular participation of aromatic black rice growers in extension activities of MOVCDS, frequent contact with agricultural extension functionaries and propaganda about MOVCDS activities through mass media and display information on MOVCDS in agricultural and horticultural departments of Manipur are the major reasons for a vast majority of aromatic black rice growers having correct knowledge regarding the benefits provided under MOVCDS.

4.3.2 Overall knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS

It is observed from Table 5 and Fig. 7 that almost half of the aromatic black rice growers (47.77%) had high level of knowledge regarding the benefits provided under MOVCDS, whereas 32.79 and 19.44 per cent of the aromatic black rice growers had medium and low level of knowledge regarding the benefits provided under MOVCDS, respectively. The finding reveals that a greater majority of aromatic black rice growers

(80.56%) had a medium to high level of knowledge regarding the benefits provided under MOVCDS. The aromatic black rice growers had a good exposure to the various promotional and extension activities such as advertisement on radio, television, putting up billboard and awareness campaigns that were organised to promote the scheme. Besides, the aromatic black rice growers had frequently contacted the project extension personnel and participated regularly in the extension/outreach activities organised by MOVCDS, hence a greater majority of aromatic black rice growers (80.56%) had a medium to high level of knowledge regarding the benefits provided under MOVCDS. Similar findings were reported by Alawa (2014) and Bori (2014).

Table 5: Overall knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS (n=180)

Sl. No.	Knowledge category	Aromatic black rice growers	
		No.	%
1.	Low (<9.58 score)	35	19.44
2.	Medium (9.58 to 11.47 score)	59	32.79
3.	High (>11.47 score)	86	47.77
	Total	180	100.00

Mean: 10.53; SD: 1.89

The results of the study revealed that there is difference in the knowledge level among aromatic black rice growers regarding the benefits provided under MOVCDS, hence the null hypothesis set forth for the study 'There is no difference in the knowledge level of aromatic black rice growers regarding the benefits provided under MOVCDS, is rejected.

4.4. Adoption of organic farming practices by aromatic black rice growers

The results in Table 6 presents the data on the adoption of organic farming practices by black rice growers, whereas Table 10 presents the data on the overall adoption of organic farming practices by the aromatic black rice growers.

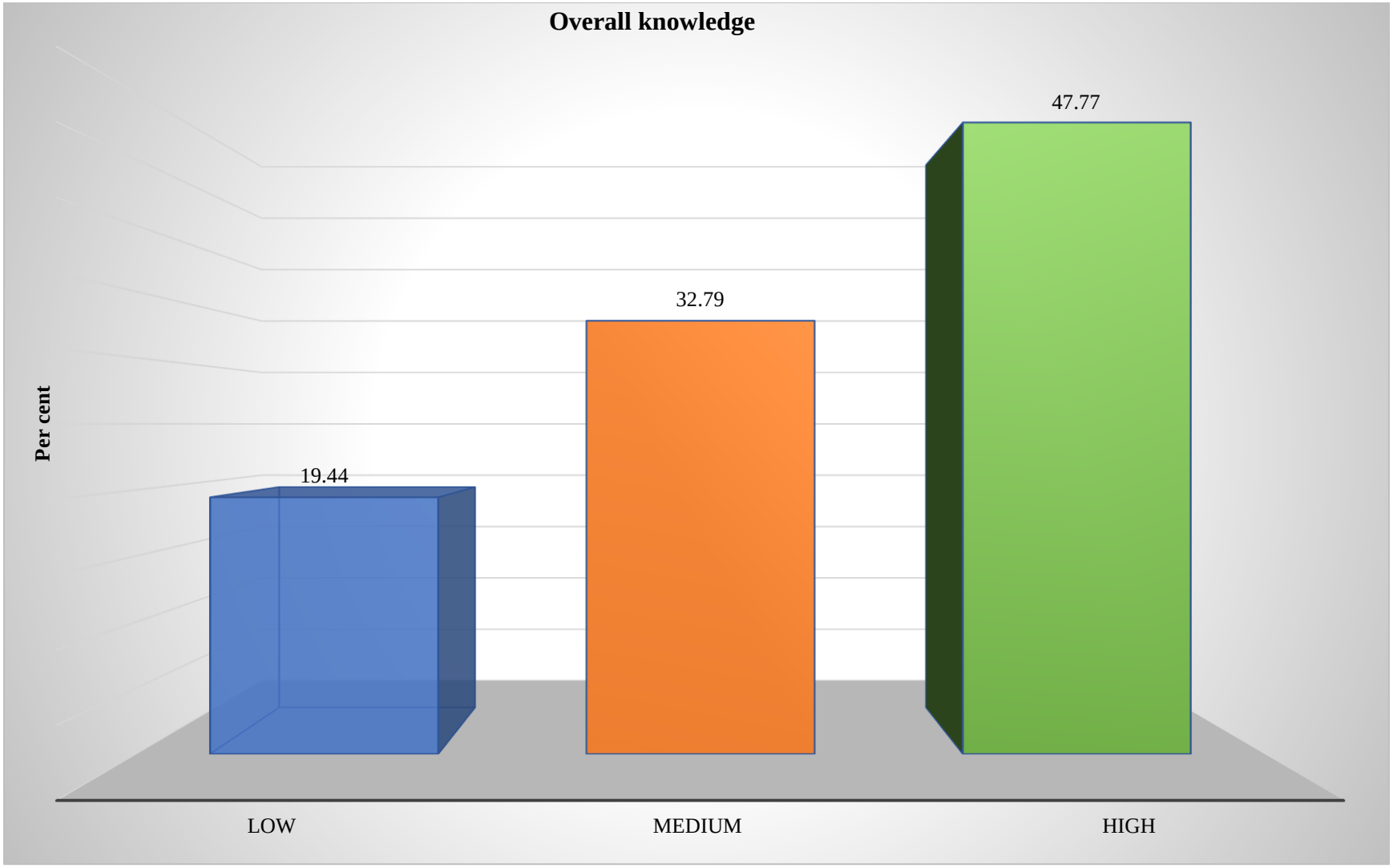

Fig. 7: Overall knowledge of aromatic black rice growers regarding benefits provided under MOVCDS

4.4.1 Adoption of nursery and transplanting practices by aromatic black rice growers

A bird's eye of Table 6 reveals that all the respondents (100.00%) had grown the recommended and more popular aromatic black rice varieties (Chakhao Poreiton and Chakhao Amubi). Similarly, all the aromatic black rice growers (100.00%) had followed the recommended seed rate of 40/50kgs per ha, for getting optimum plant population and crop yield.

With regards to the nursery preparation practices, all the respondents have completely adopted recommended practices such as: seed treatment in saltwater of proportion 1:4 (salt to water by volume) for selecting heavy seeds (100.00%) and keeping the seedbed moist, for the first 4-5 days and avoiding flooding of bed (100.00%). A majority of aromatic black rice growers had completely adopted the recommended cultivation practices like: sowing pre-germinated seeds and broadcasting on a drained bed at the rate of 50-60 g seeds/sq meter (or 10 sq. ft) (66.67%) and application and mixing of farm yard manure (300 kgs/750 m^2) (62.22%). The above recommended cultivation practices are very essential for successfully raising seedlings in the main field; hence the respondents have completely adopted the recommended technologies.

In respect of preparation of main field, it is observed that all the aromatic black rice growers had prepared the land (3-4 ploughings) (100.00%) and have followed secondary tillage followed by puddling and levelling (100.00%). The above technologies are prerequisite for raising any crop, hence all the respondents have followed the technologies. Only 28.89 per cent of the aromatic black rice growers had completely applied the lime at the rate of 500-700kg /ha during the first and second ploughing, while 60.00 per cent of aromatic black rice growers had partially applied the lime at the rate of 500-700kg /ha during the first and second ploughing and the remaining 11.11 per cent of the aromatic black rice growers had not adopted the lime to the fields. Due to lack of access of lime coupled with economic constraint, a larger number of the aromatic black rice growers (71.11%) had not applied/partially applied the lime at the rate of 500-700kg /ha during the first and second ploughing.

Table 6: Adoption of nursery and transplanting practices by aromatic black rice growers (n=180)

Sl. No.	Particulars	Extent of adoption					
		Complete adoption		Partial adoption		Non adoption	
		No.	%	No.	%	No.	%
1.0	Variety (Chakhao Poreiton/ Chakhao Amubi)	180	100.00	0	0.00	0	0.00
2.0	Seed rate (40-50 kg/ha)	180	100.00	0	0.00	0	0.00
3.0	Nursery preparation practices						
3.1	Seed treatment in saltwater of proportion 1:4 (salt to water by volume) for selecting heavy seeds	180	100.00	0	0.00	0	0.00
3.2	Application and mixing of farm yard manure (300 kgs/750 m^2)	112	62.22	68	37.78	0	0.00
3.3	Sowing pre-germinated seeds and broadcasting on a drained bed at the rate of 50-60 g seeds/sq meter (or 10 sq. ft)	120	66.67	60	33.33	0	0.00
3.4	Keeping the seedbed moist, for the first 4-5 days and avoiding flooding of bed	180	100.00	0	0.00	0	0.00
4.0	Preparation of main field						
4.1.	Preparing of land (3-4 ploughings)	180	100.00	0	0.00	0	0.00
4.2	Secondary tillage followed by puddling and levelling	180	100.00	0	0.00	0	0.00
4.3	Application of lime at the rate of 500-700kg /ha during the first and second ploughing	52	28.89	108	60.00	20	11.11
5.0	Planting seedlings in main field						
5.1	Seedlings of 20-25 days old transplanted in main field	180	100.00	0	0.00	0	0.00
5.2	Transplanting seedlings in 20cm rows 10 cm apart with 2- seedling/hill	180	100.00	0	0.00	0	0.00
5.3	Transplanting seedlings at a depth of at least 5 cm	180	100.00	0	0.00	0	0.00

With respect to the planting of seedlings in the main field, all the aromatic black rice growers had completely adopted the recommended cultivation practices such as: seedlings of 20-25 days old transplanting in main field (100.00%), transplanting seedlings in 20 cm rows 10 cm apart with 2- seedling/hill (100.00%) and transplanting seedlings at a depth of at least 5 cm (100.00%). The above technologies are also important in raising seedlings in the main field for getting optimum crop yield, hence all the respondents have adopted the technologies.

4.4.2 Adoption of nutrient and water management practices by aromatic black rice growers

The adoption of nutrient and water management practices by aromatic black rice growers are presented in Table 7. In respect of nutrient management practices, it is seen from Table 7 that a majority of the aromatic black rice growers had completely applied liquid manure Humicil (L) (500 ml/ha) as a one time application (68.89%), azolla as green manure/biofertilizer (64.44%), farm yard manure or compost (2 t/ha) (60.00%), and weed biomass/ crop residue (5 t/ha) (53.33%) as recommended. All the respondents had not applied /partially applied neem cake (250-300 kgs/ha) during land preparation (100.00%), while a majority of aromatic black rice growers had not applied /partially applied vermicompost (5t/ha) (84.44%) and rock phosphate (250 kg/ha) during land preparation (57.78%). Depending on the availability of organic manure, economic constraints and lack of knowledge on the importance of organic manure the respondents have not completely applied the recommended quantity of organic manure.

Although the aromatic black rice growers have applied a variety of organic manure, but some of them have not adopted it. Hence, the extension personnel should educate the aromatic black rice growers about the benefits in using the organic manure and encourage the aromatic black rice growers to use more of organic manure, which would result in increased soil fertility for getting better and sustained crop yields. The MOVCDS authorities should make arrangements for providing adequate quantity of organic manure at right time in nearby villages to the aromatic black rice growers.

Table 7: Adoption of nutrient and water management practices by aromatic black rice growers (n=180)

Sl. No.	Particulars	Extent of adoption					
		Complete adoption		Partial adoption		Non adoption	
		No.	%	No.	%	No.	%
1.0	**Nutrient management practices**						
1.1	Incorporating farm yard manure or compost (2 t/ha)	108	60.00	72	40.00	0	0.00
1.2	Incorporating weed biomass/ crop residue (5 t/ha)	96	53.33	84	46.67	0	0.00
1.3	Application of neem cake (250-300 kgs/ha) during land preparation	0	0.00	124	68.89	56	31.11
1.4	Application of rock phosphate (250 kg/ha) during land preparation	76	42.22	72	40.00	32	17.78
1.5	Application of bio-fertilizers like azospirillum (1 kg/ha) mixed with 40-50 kg FYM	108	60.00	72	40.00	0	0.00
1.6	Application of azolla as green manure/biofertilizer	116	64.44	0	0.00	64	35.56
1.7	Application of liquid manure Humicil (L) (500 ml/ha) as a one time application	124	68.89	56	31.11	0	0.00
1.8	Application of vermicompost (5t/ha)	28	15.56	100	55.56	52	28.89
2.0	**Water management practices**						
2.1	Limiting the level of water in the plots to 2.5cms during the first 10 days	156	86.66	0	0.00	24	13.33
2.2	Maintaining a continuous sub-mergence of 2-5cm during crop growing period until 10 days before harvesting	160	88.89	0	0.00	20	11.11
2.3	Limiting the level of water to 5cm during the time of tillering	160	88.89	0	0.00	20	11.11
2.4	Periodical draining and drying of the land for aeration	144	80.00	0	0.00	36	20.00

A vast majority of aromatic black rice growers had followed the recommended water management practices such as: maintaining a continuous sub-mergence of 2-5 cm during crop growing period up to 10 days before harvesting (88.89%), limiting the level of water to 5 cm during tillering (88.89%), limiting the level of water to 2.5 cm in the rice plots during the first 10 days (86.66%) and periodical draining and drying of the land for aeration (80.00%). It is evident from the findings that most of aromatic black rice growers were aware about the advantages and judicial use of water in rice fields, hence majority of the respondents have adopted the recommended water management practice. Water is an important and scarcity input; hence its utilization and management are very important to obtain better crop production and productivity. Effectiveness in water saving and efficiency in water use are the two important sustainable use of available surface and ground water resources. Over irrigation and its bad impact on physical, chemical and biological properties of soil can be checked when water is used efficiently and economically.

4.4.3 Adoption of weed management practices by aromatic black rice growers

The results in Table 8 present the data on the adoption of cultural and mechanical methods of controlling weeds by the aromatic black rice growers. In respect of cultural methods of controlling weeds, its was found that all the aromatic black rice growers had followed frequent shallow ploughing before transplanting for controlling annual weeds (100.00%), deep ploughing in summer months was carried out to control deep-rooted perennial weeds (100.00%) and incorporation of weeds regularly into soil during fallow period (100.00%), while a majority of the aromatic black rice growers had followed flooding up to 10-20 cm early in the season for reducing weed infestation (86.67%), followed crop rotations to reduce weed population (66.67%) and dual cropping of rice and azolla for supressing the weeds (64.44%). It can also be observed that a vast majority of the aromatic black rice growers (88.33%) had not followed the practices of releasing ducklings to minimize the weed and pests mostly because they did not own ducks and did not hire ducks because they presumed that ducking would cause harm to the rice crop instead of minimizing the weeds and pests.

With respect to the mechanical method of controlling weeds, a vast majority of the aromatic black rice growers had practiced hand weeding and stirring the soil followed for good aeration (91.11%) and used rotary weeder to control interspace weed (75.56%).

Table 8: Adoption of weed management practices by aromatic black rice growers

(n=180)

Sl. No.	Particulars	Extent of adoption					
		Complete adoption		Partial adoption		Non adoption	
		No.	%	No.	%	No.	**%**
1.0	**Cultural method of controlling weeds**						
1.1	Annual weeds controlled by frequent shallow ploughing before transplanting	180	100.00	0	0.00	0	0.00
1.2	Deep-rooted perennial weeds controlled by deep ploughing in summer months	180	100.00	0	0.00	0	0.00
1.3	Crop rotation followed to reduce weed population	120	66.67	0	0.00	60	33.33
1.4	Regular incorporation of weeds into soil during fallow period	180	100.00	0	0.00	0	0.00
1.6	Flooding up to 10-20 cm early in the season for reducing weed infestation	156	86.67	0	0.00	24	13.33
1.7	Dual cropping of rice and azolla for suppressing weed	116	64.44	0	0.00	64	35.56
1.8	Releasing about 20 ducklings for minimizing weed and pests	21	11.67	0	0.00	159	88.33
2.0	**Mechanical method of controlling weeds**						
2.1	Hand weeding and stirring the soil followed for good aeration	164	91.11	0	0.00	16	8.89
2.2	Rotary weeder used to control interspace weed	136	75.56	0	0.00	44	24.44

The aromatic black rice growers have realised the harmful effects regarding the utilization of herbicides which affects the soil health. Hence, the respondents have followed cultural and mechanical methods of controlling weeds. Due to scarcity of labour few of the aromatic black rice growers have not completely adopted the cultural and mechanical methods of controlling weeds in rice fields.

4.4.4 Adoption of plant protection and harvesting practices by aromatic black rice growers

The adoption of plant protection practices and harvesting practices of aromatic black rice growers is presented in Table 9.

In respect of the cultural method of controlling pests before sowing, it was found that all the aromatic black rice growers had followed deep summer ploughing (100.00%), timely destruction of diseased crop residue (100.00%) and seed/seedling treatment (100.00%). With respect to the cultural method of controlling pests after sowing, majority of the aromatic black rice growers had followed proper water management practices (80.00%), performed weed controlling measures at right time (75.00%) and applied excess organic manure to the rice fields (60.00%). In respect of the mechanical method of plant protection, the results revealed all the aromatic black rice growers had collected and destructed the eggs, larvae and pupae of crop pests (100.00%) and destroyed the affected plant parts (100.00%), whereas majority of the aromatic black rice growers had used rope dipped in kerosene for minimizing the pest attack (68.89%) and less than half of the respondents had installed light traps/pheromone traps to attract adult pests (46.67%). Since most of the cultural method of controlling pests are simple and no/low cost technologies, a larger number of aromatic black rice growers have completely adopted the cultural methods of plant protection. Due to non-availability of adequate number light traps/pheromone traps in the study area, 46.67 per cent of the aromatic black rice growers had installed light traps/pheromone traps to attract adult pests.

Table 9: Adoption of plant protection and harvesting practices by aromatic black rice growers (n=180)

Sl. No.	Particulars	Extent of adoption					
		Complete adoption		Partial adoption		Non adoption	
		No.	%	No.	%	No.	%
A.	**Plant protection practices**						
1.00	Cultural method						
1.1	**Before sowing**						
1.1.1	Deep summer ploughing	180	100.00	0	0.00	0	0.00
1.2.1	Timely destruction of diseased crop residue	180	100.00	0	0.00	0	0.00
1.3.1	Seed / seedling treatment	180	100.00	0	0.00	0	0.00
1.2.0	**After sowing**						
1.2.1	Application of more organic manure	108	60.00	0	0.00	72	40.00
1.2.1	Proper water management practices	144	80.00	0	0.00	36	20.00
1.2.2	Weed control at right time	135	75.00	0	0.00	45	25.00
2.0	**Mechanical method**						
2.1	Collection and destruction of eggs, larvae and pupae of crop pests	180	100.00	0	0.00	0	0.00
2.2	Installed light traps/pheromone traps to attract adult pests	84	46.67	0	0.00	96	53.33
2.3	Destruction of affected plant parts	180	100.00	0	0.00	0	0.00
4.4	Use of rope dipped in kerosene for minimizing the pest attack	124	68.89	0	0.00	56	31.11
3.0	**Biological method**						
3.1	Spraying of neem oil @ 2-3ml/lt of water for controlling lepidopteran pests (500 litres/ha)	52	28.89	128	71.11	0	0.00
3.2	Spraying of 2% solution of turmeric powder for managing rice blast (500 litres/ha)	36	20.00	72	40.00	72	40.00
3.3	Spraying of *Verticiliumlecanii* @ $1x10^9$ spores/ml to control white backed plant hoppers	36	20.00	96	53.33	48	26.67
3.4	Releasing *Tricogramma* egg parasitoid @50000/ha for controlling leaf folder and stem borer	0	0.00	104	57.78	76	42.22
3.5	Spraying of *Beauveria bassiana* @ 3 g/lt for control of rice hispa (500 litres/ha)	36	20.00	100	55.56	44	24.44
B.	**Harvesting practice**						
1.0	Harvesting the crop when more than 90% of panicles have turned to a hard dough stage	180	100.00	0	0.00	0	0.00

In respect of biological method of plant protection measures, a little over one-fourth of the aromatic black rice growers (28.89%) had not completely adopted the recommended dosage of spraying of neem oil @ 2-3ml/lt of water (500 litres/ha) to control lepidopteran pests, while one-fifth of the aromatic black rice growers had not completely adopted the recommended dosage of spraying of 2% solution of turmeric powder for managing rice blast (500 litres/ha) (20.00%), spraying of *Verticiliumlecanii* @ $1x10^9$ spores/ml to control white backed plant hoppers (20.00%), and spraying of *Beauveria bassiana* @ 3 g/lt for control of rice hispa (500 litres/ha) (20.00%). A little more than four tenth (42.22%) of the aromatic black rice growers have not released *Tricogramma* egg parasitoid @50000/ha for controlling stem borer and leaf folder, while a majority of the respondents (57.78%) have partially released *Tricogramma* egg parasitoid @50000/ha for controlling stem borer and leaf folder.

Due to scarcity of *Tricogramma* egg parasites and bioagents like *Verticiliumlecanii* and *Beauveria bassiana*, in the study area a vast majority of aromatic black rice growers were not able to completely adopt the biological method of controlling pests in rice fields. The extension workers should supervise the easy accessibility and ready availability of turmeric powder, *Tricogramma* egg parasites and bioagents like *Verticiliumlecanii* and *Beauveria bassiana* to control the harmful pests on rice crop. It is also necessary that the aromatic black rice growers need to be convinced regarding the use of the turmeric powder, *Tricogramma* egg parasites and bioagents like *Verticiliumlecanii* and *Beauveria bassiana* for controlling the harmful pests in rice. This could be done by making use of a combination of extension methods such as farm and home visit, demonstration, farm school/farm field schools, exhibitions, field days coupled with the use of mass media for greater utilization of technology by the aromatic black rice growers.

It is heartening to note that all the aromatic black rice growers were found to be harvesting the crop when more than 90 per cent of panicles have turned to a hard dough stage, which will ensure the respondent for getting optimum crop yield (Table 9).

4.4.5 Overall adoption of organic farming practices by aromatic black rice growers

The overall adoption organic farming practices followed by aromatic black rice growers is presented in Table 10 and Fig 8. It could be seen from the table that a larger proportion of aromatic black rice growers (40.55%) belonged to the high adoption category, while 35.00 per cent of them were belonging to the medium adoption category and about one-fourth (24.45%) of the aromatic black rice growers belonged to low adoption category of organic farming practices. It is conclusive that majority of the aromatic black rice growers (75.55%) belonged to medium to high categories of overall adoption of organic black rice practices.

Table 10: Overall adoption of organic farming practices by aromatic black rice growers (n=180)

Sl. No.	Adoption category	Aromatic black rice growers	
		No.	%
1.	Low (< 102.58 score)	44	24.45
2.	Medium (102.58 to 122.74 score)	63	35.00
3.	High (>122.74 score)	73	40.55
	Total	180	100.00

Mean : 112.66; SD: 20.16

Majority of the aromatic black rice growers had completely adopted technologies/practices such as, variety, seed rate, nursery management practices, preparation of main field practices , planting seedlings in main field, nutrient management practices, water management practices, weed management practices, cultural and mechanical method of plant protection, and harvesting practices, hence three-fourth (75.55%) of the aromatic black rice growers belonged to medium to high categories of adoption of organic black rice practices, However, about one-fourth of the aromatic black rice growers were belonging to the low adoption category of organic farming practices could be attributed that most of the farmers were resource poor and were economically

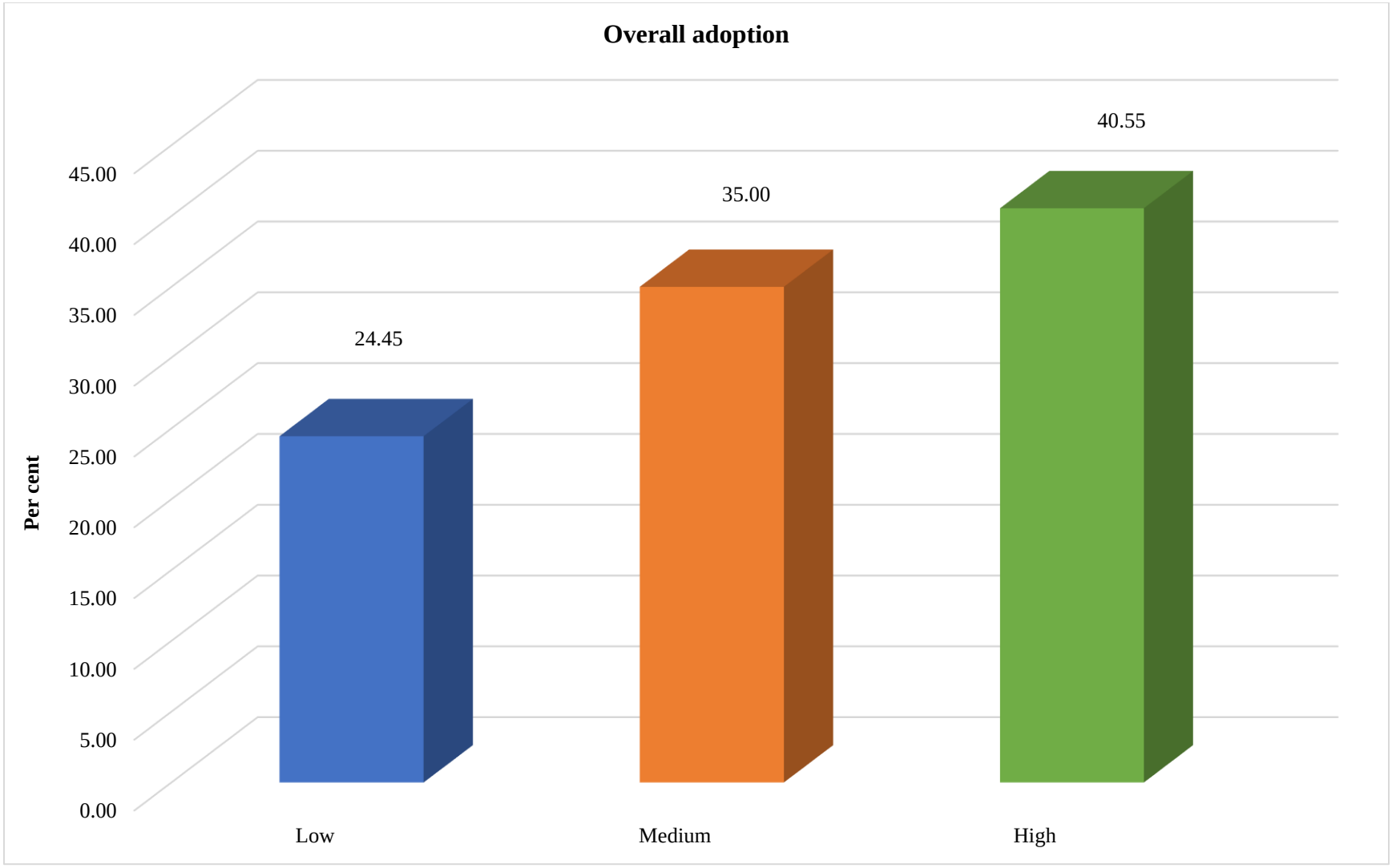

Fig. 8: Overall adoption of organic farming practices by aromatic black rice growers

constrained to purchase bio fertilizers, Humicil (L) etc., and there was non -availability of neem cake, *Tricogramma* egg parasites and bio agents like *Verticiliumlecanii* and *Beauveria bassiana* in the project area. The present findings of the research study is similar to the findings reported by Assis and Ismail Mohammed (2011), Adesope *et al.* (2012), Tanweer (2019) and Chaitra (2020).

The results of the study revealed that there is difference in the adoption level of organic farming practices followed by aromatic black rice growers. Therefore, the null hypothesis set forth for the study 'There is no difference in the adoption level of organic farming practices by the aromatic black rice growers", is rejected.

4.5. Impact of Mission Organic Value Chain Development Scheme on crop yield and income of aromatic black rice growers

The impact of MOVCDS on the crop yield and income of the aromatic black rice growers before and after registering to MOVCDS are presented in Table 11.

4.5.1 Impact of MOVCDS on crop yield

The aromatic black rice growers had obtained a slight increase in the grain yield (11.50 q/acre) after registering to MOVCDS, as compared to the grain yield obtained by them before they joined MOVCDS (10.90 q/acre) (Table 11) (Fig. 9). There was an increase of 5.21 per cent in grain yield after registering to MOVCDS. The black rice growers could harvest a slight increase in the straw yield (2.67 t/acre) after registering to MOVCDS when compared with the straw yield before registering to MOVCDS (2.53 t/acre) (Table 11) (Fig. 10). There was an increase of 5.24 per cent in straw yield after the aromatic black rice growers registering to MOVCDS. The student 't' test value indicated that there was a non-significant increase in both grain yield (0.99) and straw yield (1.01) by the respondents before and after registering to MOVCDS.

4.5.2 Impact of MOVCDS on gross income of aromatic black rice growers

The gross income from the grain yield earned by the aromatic black rice growers after registering to MOVCDS (Rs. 66,700/acre) was much higher than the gross income

obtained from grain yield before registering to MOVCDS (Rs. 49,050/acre) (Table 11 and Fig. 11). There was an increase in 26.46 per cent of gross income obtained from grain yield after the respondents registering for MOVCDS. The student 't' test value (1.88) indicated a significant increase in the gross increase obtained from grain yield before and after registering for MOVCDS by aromatic black rice growers.

Table 11: Impact of MOVCDS on crop yield and income of aromatic black rice growers

Sl. No.	Particulars	Aromatic black rice growers		Percentage increase	't' value
		Before MOVCDS	After MOVCDS		
1	**Productivity (yield/acre)**				
a	Grain yield (q/acre)	10.90	11.50	5.21	0.99^{NS}
b	Straw (t/acre)	2.53	2.67	5.24	1.01^{NS}
2	**Gross income (yield x price of produce) (Rs/acre)**				
a	Grain (Rs/acre)	49,050	66,700	26.46	1.88*
b	Straw (Rs/acre)	4,428	4,672	5.22	1.03^{NS}
c	Total	53,478	71,372	25.07	2.85*
3	**Net income (Gross income-cost of cultivation) (Rs/acre)**				
	Total	29,478	50,372	41.47	2.68**

Note: Cost of cultivation before and after MOVCDS is Rs. 24000/acre and Rs. 21000/acre, respectively; Price of aromatic black rice grain before and after MOVCDS is Rs. 4500/q and Rs.5800/q, respectively; Price of straw is 1750/tonne; NS= Non-significant; *= Significant at 5%; **= Significant at 1%

A slight increase in respect of the gross income from straw yield by the aromatic black rice growers after registering to MOVCDS (Rs. 4,672/ acre) as compared to before registering to MOVCDS (Rs. 4,428/ acre) (Fig. 12). There was an increase of 5.22 per cent in gross income obtained from straw yield by the aromatic black rice growers after

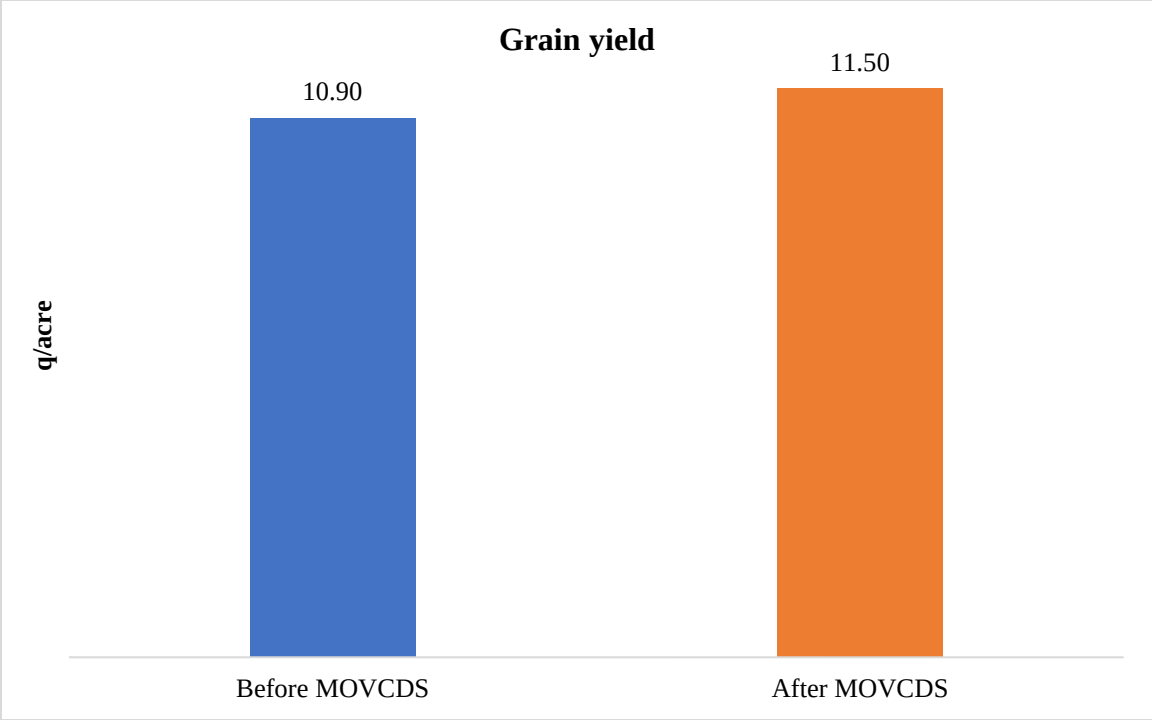

Fig. 9: Grain yield (q/acre) of aromatic black rice growers before and after MOVCDS

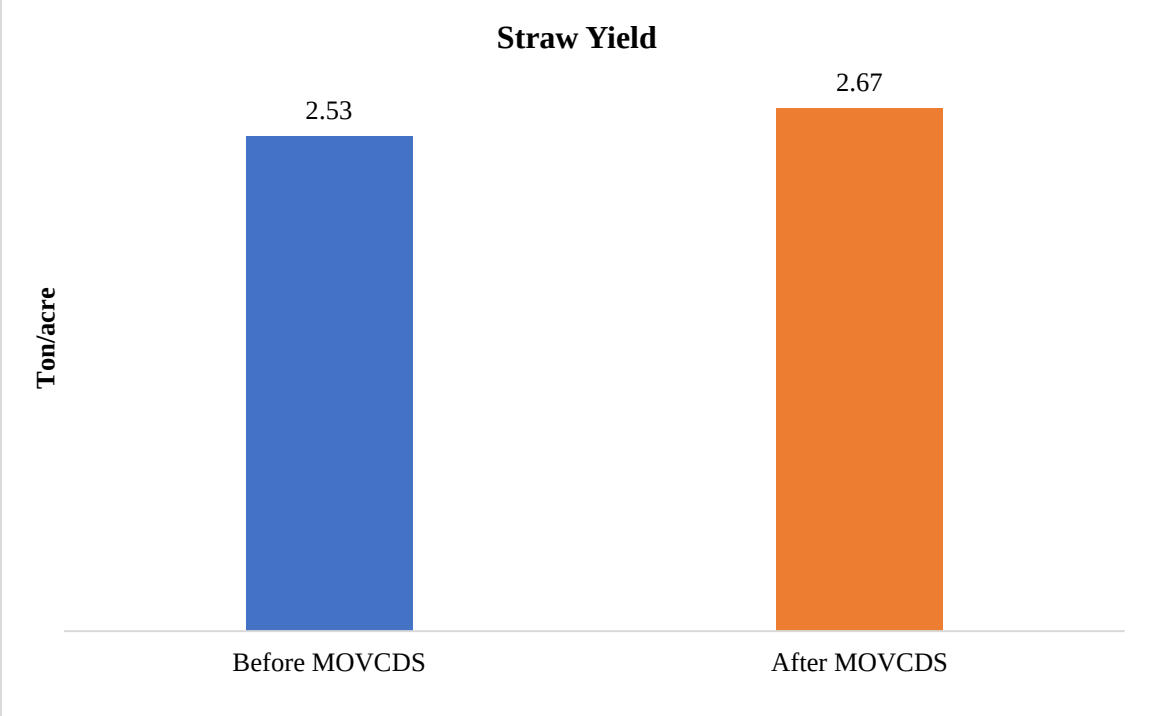

Fig. 10: Straw yield (t/acre) of aromatic black rice growers before and after MOVCDS

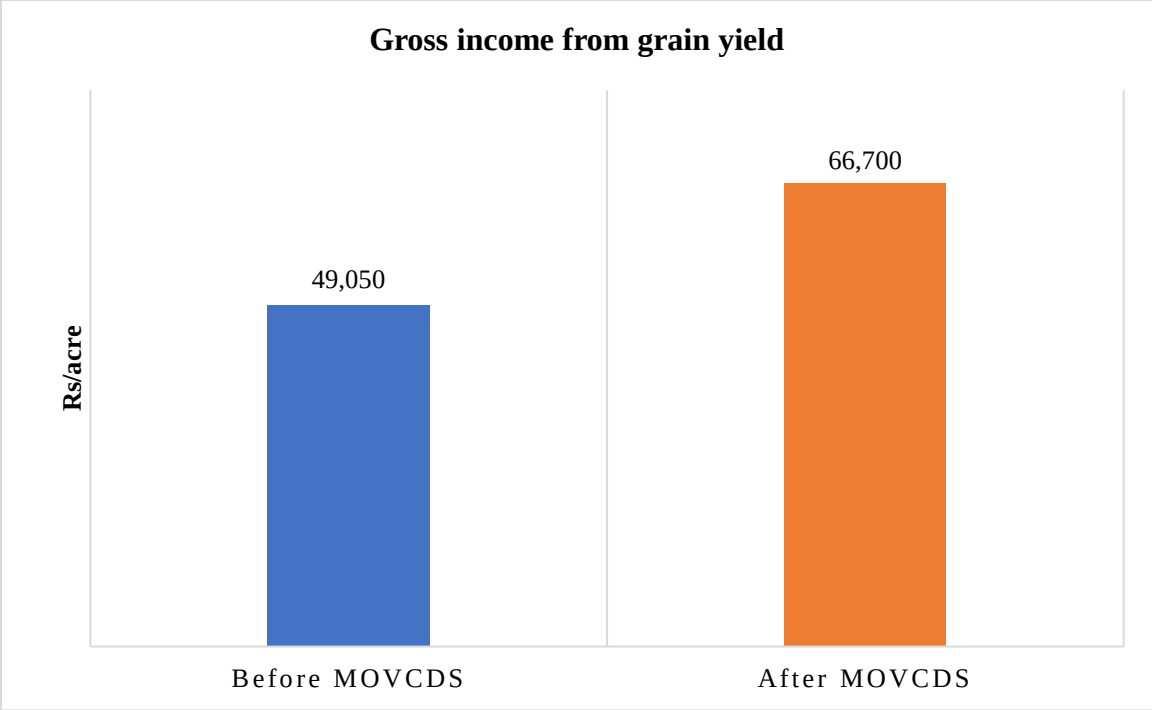

Fig. 11: Gross income (Rs/acre) from grain yield of aromatic black rice growers before and after MOVCDS

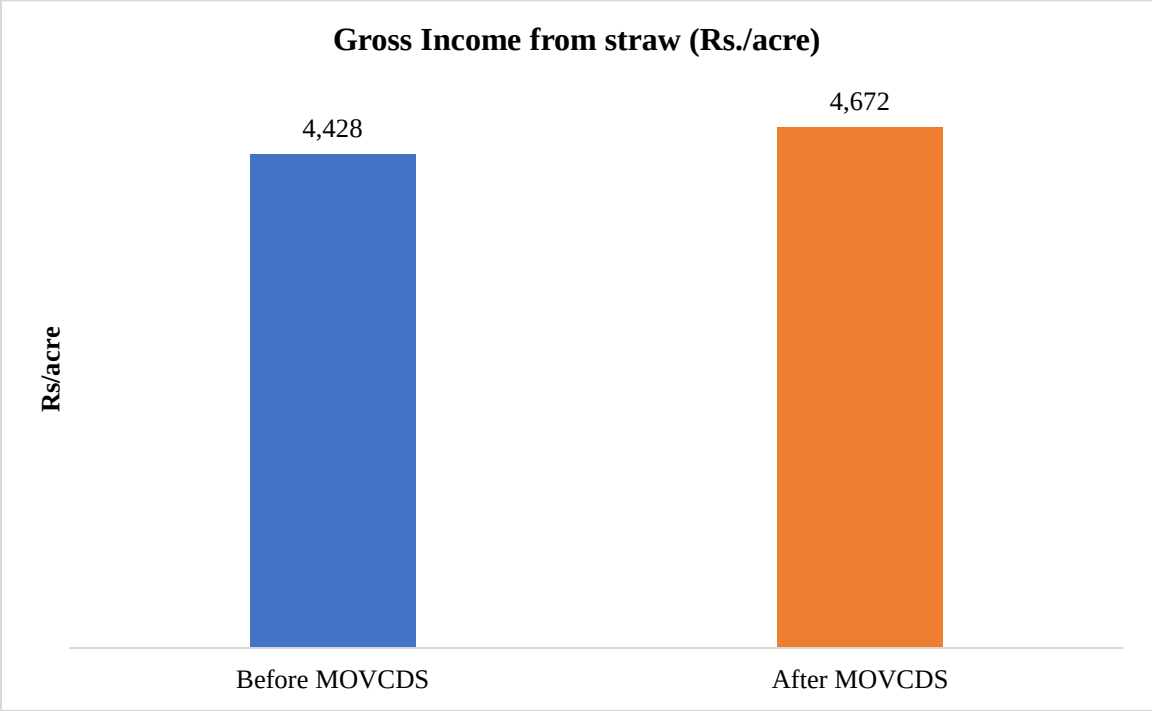

Fig. 12: Gross income (Rs/acre) from straw yield aromatic black rice growers before and after MOVCDS

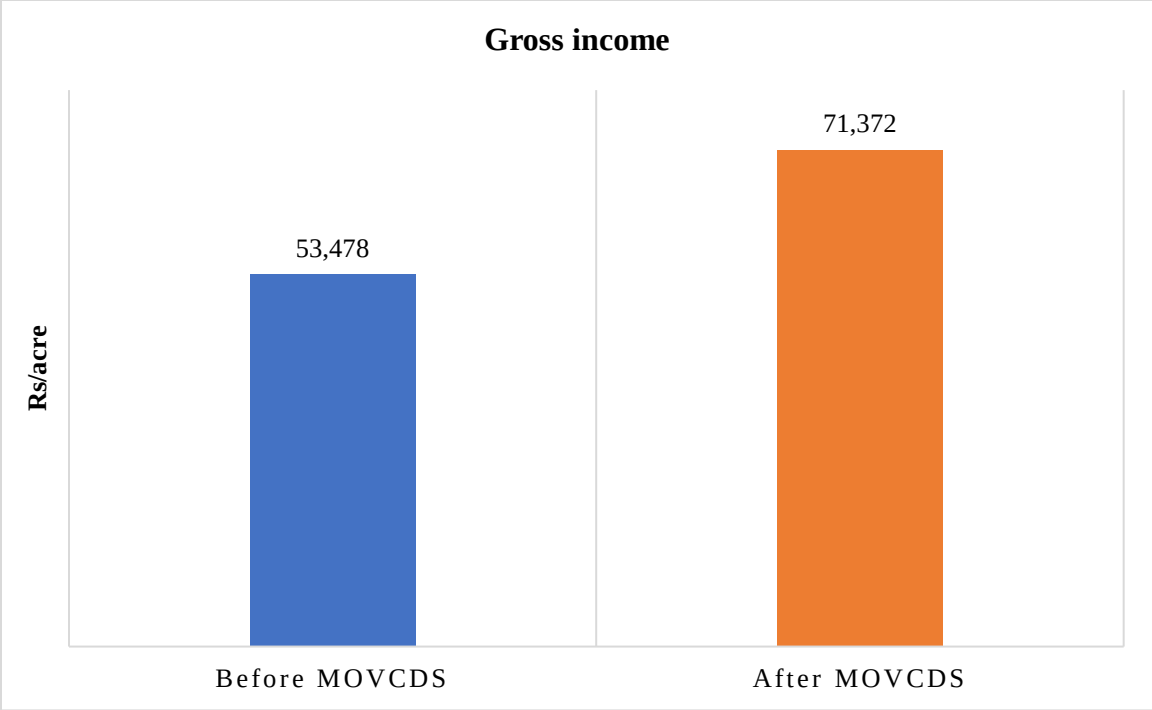

Fig. 13: Gross income (Rs/acre) of aromatic black rice growers before and after MOVCDS

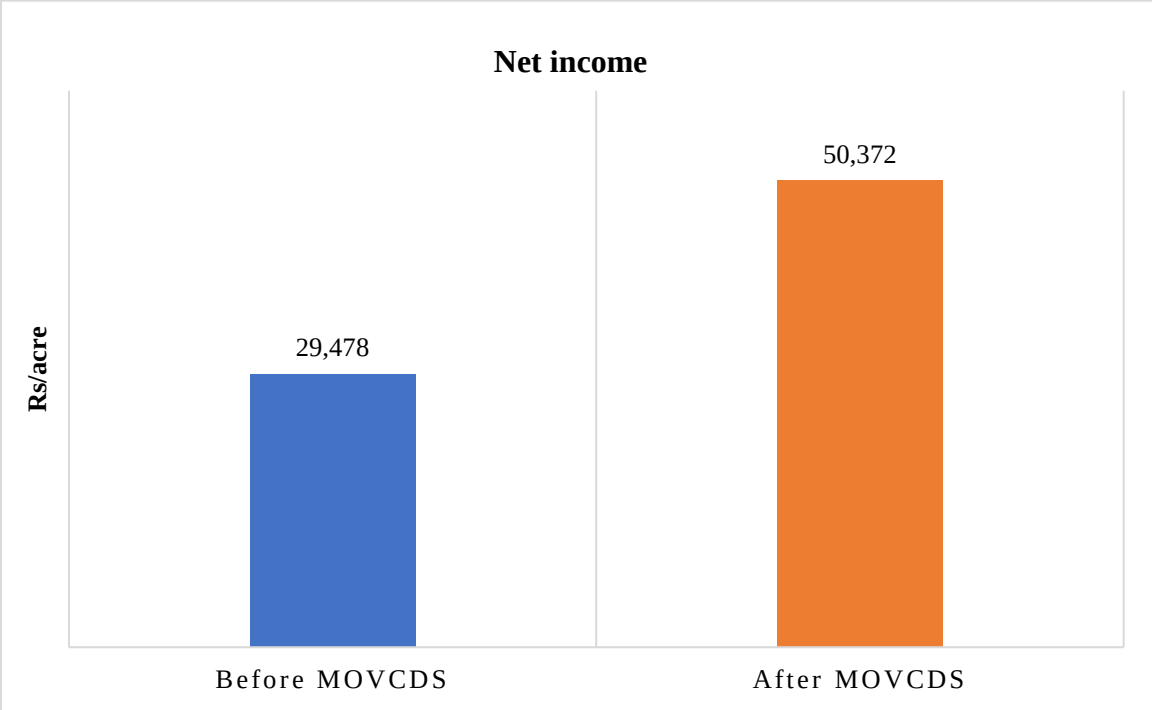

Fig. 14: Net income (Rs/acre) of aromatic black rice growers before and after MOVCDS

registering to MOVCDS, however the 't' value (1.03) revealed a non-significant increase in the gross income obtained from straw yield of the aromatic black rice growers when compared to before and after registering to MOVCDS.

The research data in Table 11 further reveals that there was a substantial increase in the total gross income of aromatic black rice growers after registering to MOVCDS (Rs.71,372/acre) as compared to the total gross income of the respondents before registering to MOVCDS (Rs. 53,478/acre) (Fig.13). There was an increase of total gross income of the aromatic black rice growers by 25.07 per cent. A significant difference was observed between the total gross income obtained by the aromatic black rice growers before and after registering to MOVCDS at five per cent level. Significant increase in respect of total gross income is because the aromatic black rice growers used to sell their produce at Rs. 4500/q in the local market before registering to MOVCDS. The beneficiary aromatic black rice growers are selling the organic aromatic black rice to MOVCDS at a premium price of Rs. 5800/q, hence there was a significant increase in the total gross income of aromatic black rice growers.

4.5.2 Impact of MOVCDS on net income of aromatic black rice growers

A perusal of Table 11 reveals that the aromatic black rice growers obtained a higher net income after registering for MOVCDS (Rs. 50,372/acre) as compared to their net income before registering to MOVCDS (Rs. 29,478/acre) (Fig.14) and the percentage increase in the net income works out to be 41.47 per cent. The student 't' test value (2.68) revealed that there exists a highly significant difference in the net income of the aromatic black rice growers before and after registering to MOVCDS.

It could be concluded from the findings in Table 11 that the aromatic black rice growers could get an increase in the grain (5.21%) and straw (5.24%) yield after registering to MOVCDS. There was also a significant increase in the gross income (25.07%) and net income (41.47%) of the aromatic black rice growers after registering to MOVCDS. The increase in crop yield and income of the aromatic black rice growers could be attributed to the impact of MOVCDS.

4.6. Association between dependent variables

4.6.1 Association between perception towards MOVCDS and knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS

It was found that majority of the aromatic black rice growers (57.14%) having poor perception towards MOVCDS were having low level of knowledge regarding the benefits provided under MOVCDS, whereas more than half of the aromatic black rice growers (51.17%) having better perception towards MOVCDS were having high level of knowledge regarding the benefits provided under MOVCDS (Table 12). Highly significant association was observed between the perception towards MOVCDS and the knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS. It is quite obvious that the aromatic black rice growers having better perception towards MOVCDS would have high knowledge level regarding the benefits provided under MOVCDS,

Table 12: Association between perception towards MOVCDS and knowledge of aromatic black rice growers regarding the benefits provided under MOVDCS (n=180)

Sl. No.	Knowledge category	Perception towards MOVCDS								Chi-square value
		Poor		Good		Better		Total		
		No.	%	No.	%	No.	%	No.	%	
1.	Low	20	57.14	9	25.71	6	17.15	35	100.00	45.18**
2.	Medium	7	11.86	22	37.28	30	50.86	59	100.00	
3.	High	6	6.97	36	41.86	44	51.17	86	100.00	
	Total	33	-	67	-	80	-	180	100.00	

**= Significant at 1%

4.6.2 Association between perception of aromatic black rice growers towards MOVCDS and adoption of organic farming practices

A bird's eye view of Table 13 reveals that 38.63 per cent of the aromatic black rice growers having poor perception towards MOVCDS were belonging to low level of

adoption. On the contrary, it was found 54.81 per cent of the aromatic black rice growers having better perception towards MOVCDS were belonging to high level of adoption. Highly significant association was seen between the perception of aromatic black growers towards MOVCDS and the adoption of organic farming practices. It could be inferred from the above results that those aromatic black rice growers who had better perception towards MOVCDS were adopting more number of organic farming technologies.

Table 13: Association between perception of aromatic black rice growers towards MOVCDS and adoption of organic farming practice (n=180)

Sl. No.	Adoption categories	Perception towards MOVCDS								Chi-square value
		Poor		Good		Better		Total		
		No.	%	No.	%	No.	%	No.	%	
1.	Low	17	38.63	10	22.72	17	38.65	44	100.00	24.27**
2.	Medium	6	9.52	34	53.96	23	36.52	63	100.00	
3.	High	10	13.69	23	31.50	40	54.81	73	100.00	
	Total	33	-	679	-	80	-	180	100.00	

**= Significant at 1%

4.6.2 Association between knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS and adoption of organic farming practices

Table 14 presents the findings relating to the association between knowledge of aromatic black rice growers regarding the benefits obtained under MOVCDS and adoption of organic farming practices. It can be observed from the table that 54.28 per cent of the aromatic black rice growers with low level of knowledge regarding the benefits provided under MOVCDS had a low level of adoption while 45.36 per cent of the aromatic black rice growers with high level of knowledge regarding the benefits provided under MOVCDS had a high adoption of organic farming technologies. The chi-square analysis revealed a highly significant association between knowledge of the aromatic black rice growers regarding the benefits provided under the scheme with the adoption level. The aromatic black rice growers having high knowledge regarding the benefits provided under

MOVCDS will have more confidence in adopting more number of organic farming practices for obtaining good yield and income.

Table 14: Association between knowledge of aromatic black rice growers regarding the benefits obtained under MOVCDS and adoption of organic farming practices (n=180)

Sl. No.	Knowledge category	Adoption of organic farming practices								Chi-square value
		Low		Medium		High		Total		
		No.	%	No.	%	No.	%	No.	%	
1.	Low	19	54.28	10	28.57	6	17.15	35	100.00	22.53**
2.	Medium	11	18.64	20	33.89	28	47.47	59	100.00	
3.	High	14	16.27	33	38.37	39	45.36	86	100.00	
	Total	44	-	63	-	73	-	180	100.00	

**= Significant at 1%

4.7. Association between profile characteristics of aromatic black rice growers with their perception, knowledge and adoption level

The association between profile characteristics of aromatic black rice growers with their perception, knowledge and adoption level are presented in Tables 14, 15 and 16. Chi square test was employed to find out the association between profile characteristics of aromatic black rice growers with their perception, knowledge and adoption.

4.7.1 Association between profile characteristics of aromatic black rice growers with their perception towards MOVCDS

Table 15 and Fig 15 present the data on the association between the profile characteristics with their perception level of aromatic black rice growers. The results revealed that age, family size, land holding, annual income, fallow period, and material possession of aromatic black rice growers had a non-significant association with their perception towards MOVCDS, whereas education, organic farming experience, livestock

possession, crop productivity, achievement motivation, aspiration, management orientation, economic motivation, risk orientation, innovative proneness, mass media exposure and training on organic farming of aromatic black rice growers were having significant association with their perception towards MOVCDS at five per cent level. The variables such as extension participation and extension agency contact of aromatic black rice growers had highly significant association with their perception towards MOVCDS. The results of the study are in line with the findings reported by Avinash (2013), Sunil (2014), Kangale *et al.* (2016) and Darshan 2018),

Table 15: Association between profile characteristics of aromatic rice growers with their perception towards MOVCDS (n=180)

Sl. No.	Characteristics	Degree of freedom	Chi-square value	Contingency coefficient
1	Age	4	2.61 ^{NS}	0.06
2	Education	4	10.62*	0.25
3	Family size	4	0.99 ^{NS}	0.02
4	Land holding	4	4.64 ^{NS}	0.12
5	Annual income	4	5.61 ^{NS}	0.13
6	Fallow period	4	2.29 ^{NS}	0.07
7	Organic farming experience	4	10.11*	0.24
8	Livestock possession	4	11.28*	0.27
9	Material possession	4	3.69 ^{NS}	0.09
10	Crop productivity	4	12.99*	0.27
11	Achievement motivation	4	11.01*	0.27
12	Aspiration	4	10.88*	0.26
13	Management orientation	4	11.66*	0.29
14	Economic motivation	4	12.68*	0.30
15	Risk orientation	4	12.22*	0.29
16	Innovative proneness	4	10.50*	0.26
17	Mass media exposure	4	10.58*	0.25
18	Training on organic farming	4	9.92*	0.21
19	Extension agency contact	4	13.61**	0.33
20	Extension participation	4	13.90**	0.34

NS= Non-significant, *=Significant at 5%, **= Significant at 1%

Explanation for the profile characteristics of aromatic black rice growers having significant and highly significant association with their perception towards MOVCDS is given in the subsequent paragraphs.

4.7.1.1 Education and perception towards MOVCDS

The chi-square test revealed a significant association between education of the aromatic black rice growers with their perception towards MOVCDS at five per cent level. Education enables the aromatic black rice growers to be more receptive of the interventions put on forward by MOVCDS. It also enables the aromatic black rice growers to comprehend the activities of MOVCDS for promoting the organic aromatic black rice production through value chain activities of production, supporting and processing and marketing components of MOVCDS, leading to better perception of respondents towards MOVCDS. Hence, there was a significant association between the education of aromatic black rice growers and perception towards MOVCDS.

4.7.1.2 Organic farming experience and perception

A significant association was existing between organic farming experience of the aromatic black rice growers and their perception towards MOVCDS. The association is quite obvious because an aromatic black rice grower with a prior experience in organic farming could able to understand the different components underlying the organic farming practices advocated under MOVCDS in an effective and efficient way, as a consequence the respondents have developed better perception towards MOVCDS.

4.7.1.3 Livestock possession and perception

There exists a significant association between the livestock possession and perception of aromatic black rice growers towards MOVCDS. The scheme promotes establishing on-farm production units like liquid manure tanks etc. for which livestock is required for preparing liquid manure. Since, the MOVCDS is providing an assistance of Rs. 3750 per ha could be availed for the establishment of on-farm input production unit, the aromatic black rice growers have developed better perception towards MOVCDS.

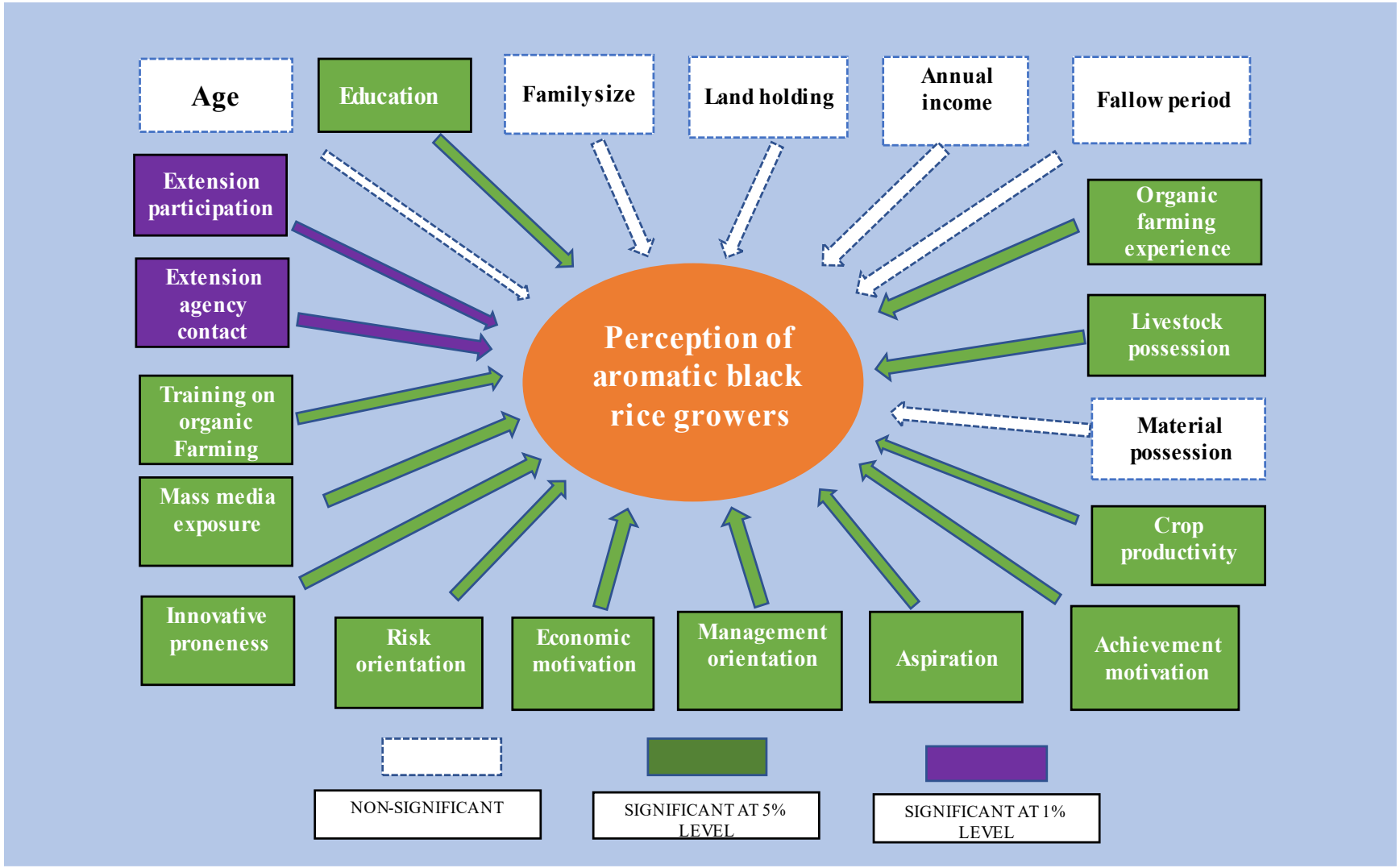

Fig. 15: Association between profile characteristics of aromatic black rice growers with their perception towards MOVCDS

4.7.1.4 Crop productivity and perception

A significant association exists between crop productivity of the respondents with their perception towards MOVCDS. The aromatic black rice growers with better perception towards MOVCDS are likely to follow organic farming technologies advocated under the scheme resulting in getting higher yield and income. Hence, there is significant association between the crop productivity of the respondents with their perception towards MOVCDS.

4.7.1.5 Achievement motivation and perception

The study reveals that there exist a significant association between achievement motivation and perception of aromatic black rice growers towards MOVCDS. The achievement of an individual is associated in excelling in farming and thereby attaining a sense of successful accomplishment. To achieve this distinction, the aromatic black rice growers would have availed the benefits of MOVCDS in the form of obtaining technical guidance on organic farming and timely supply of organic inputs, hence there exists a significant association between the perception of aromatic black rice growers with their achievement motivation level.

4.7.1.6 Aspiration and perception

There was a significant association exist between the perception of aromatic black rice growers with their aspiration level. The aromatic black rice growers aspire to bring about improvement in their standard of living by actively involving in the activities of MOVCDS. Their aspiration has made them reach out to extension agents and participate in extension activities of MOVCDS for obtaining good crop yield and income. These reasons may have helped the respondents in forming a better perception towards the scheme.

4.7.1.7 Management orientation and perception

Management orientation and perception of aromatic black rice growers have exhibited a significant association at five per cent level. The urge of the respondents to perform better will act as an instrument to adopt the managerial activities relating to

organic farming. MOVCDS is promoting crop planning and time management by motivating the respondents to actively participate in the value chain activities of MOVCDS. Hence, the management orientation and perception towards MOVCDS have significant association with one another.

4.7.1.8 Economic motivation and perception

A significant association exist between economic motivation of the aromatic black rice growers with their perception towards MOVCDS at five per cent level. The major motto of the aromatic black rice growers is to improve the economic condition by availing the benefits of MOVCDS. The respondents have availed the incentives and financial assistance for on-farm production inputs, off-farm inputs and seeds, besides getting good price for the produce. Because of the above reasons, there is a significant association exists between the economic motivation and perception of aromatic black rice growers towards MOVCDS.

4.7.1.9 Risk orientation and perception

Risk orientation of aromatic black rice growers and perception towards MOVCDS has a significant association. The various risks involved in organic farming include risks of scarcity of organic manure, water scarcity, drought, pests and diseases, market failure etc. In this context, the aromatic black rice growers with more risk orientation will be regularly contacting agricultural extension functionaries for receiving timely information related to organic farming, obtaining subsidy/financial assistance for on and off farm inputs, agricultural insurance, weather forecasting, marketing facilities etc., hence there exists a significant association between risk orientation of aromatic black rice growers with their perception towards MOVCDS.

4.7.1.10 Innovative proneness and perception

Innovative proneness of aromatic black rice growers and perception towards MOVCDS had a significant association. The interest of the farmers to know more about MOVCDS and adopt the organic farming practices predisposes them to seek additional information from the extension functionaries of MOVCDS, hence there exist a significant

association between innovative proneness of aromatic black rice growers and perception towards MOVCDS.

4.7.1.11 Mass media exposure and perception

Mass media exposure and perception of the aromatic black rice growers towards MOVCDS were having a significant association. The authorities of MOVCDS have advertised in both print and electronic media regarding the benefits of cultivating crops under organic farming and the advantages of farmers joining MOVCDS. Exposure to mass media by the farmers has given an opportunity for the aromatic black rice growers to get aware about the activities of MOVCDS in promoting organic farming, hence a significant association exist between mass media exposure of the respondents and their perception towards MOVCDS.

4.7.1.12 Training on organic farming and perception

The significant association between training on organic farming and perception towards MOVCDS was obvious because participation of respondents in the training programmes on organic farming has given an opportunity to acquaint themselves not only on the organic farming practices of aromatic black rice but also on the various benefits of MOVCDS, hence there exist a significant association between the training on organic farming of aromatic black rice growers and their perception towards MOVCDS.

4.7.1.13 Extension agency contact and perception

Extension agency contact of aromatic black rice growers and their perception towards MOVCDS had highly significant association. The agricultural extension personnel working in MOVCDS has disseminated information on the organic farming practices to be followed by the beneficiaries, various incentives available under the scheme, marketing facilities for the crop produce etc. Hence, a highly significant association exist between the extension agency contact of respondents with their perception towards MOVCDS.

4.7.1.14 Extension participation and perception

Extension participation of aromatic black rice growers and perception towards MOVCDS had a highly significant association. The participation of aromatic black rice growers in the extension activities (conventions, field days, demonstrations, field days, exhibitions etc.) has motivated the respondents to participate and avail the benefits under MOVCDS, as a result extension participation of aromatic black rice growers was found to have a highly significant association with the perception towards MOVCDS.

The hypothesis set forth for the study i.e., There is no association between the profile characteristics of aromatic black rice growers with their perception towards MOVCDS is partially rejected, since many of the profile characteristics of aromatic black rice growers had significant and highly significant association with the perception towards MOVCDS.

4.7.2 Association between profile characteristics of aromatic black rice growers with their knowledge regarding the benefits provided under MOVCDS

The association in respect of profile characteristics of aromatic black rice growers with their knowledge **o**f aromatic black rice growers regarding the benefits provided under MOVCDS are presented in Table 16 and Fig. 16. Variables such as, age, family size, land holding, annual income, fallow period, and material possession of aromatic black rice growers were having a non-significant association with their knowledge regarding the benefits provided under MOVCDS. While education, organic farming experience, livestock possession, crop productivity, achievement motivation, aspiration, management orientation, economic motivation, risk orientation, and mass media exposure of aromatic black rice growers were having significant association with their knowledge level at five per cent level. The other variables namely, innovative proneness, training on organic farming, extension participation and extension agency contact of aromatic black rice growers had highly significant association with their knowledge level. Similar results were reported by Venkatesh *et al.* (2013), Anju Duhan and Meenakshi Dhingra (2018) and Triveni *et al.* (2018).

The probable reasons for the profile characteristics of aromatic black rice growers having significant and highly significant association with their knowledge regarding benefits provided under MOVCDS is presented in the ensuing paragraphs.

4.7.2.1 Education and knowledge

Education and knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS were having significant association. Education plays a vital in widening the intellect of an individual person making them amenable towards the information about MOVCDS gathered via., print media (newspaper, farm magazines etc.) and electronic media (radio, television, internet etc.) has enabled the respondents in having good knowledge about the benefits provided under MOVCDS

4.7.2.2 Organic farming experience and knowledge

The experience in organic farming of the aromatic black rice growers had a significant association with the knowledge regarding the benefits provided under MOVCDS. Having earned the experience of organic farming after being involved in benefits of MOVCDS by partaking in the extension activities as well as after implementing the interventions advocated by MOVCDS, it is obvious that organic farming experience would be associated with knowledge about the benefits provided under MOVCDS.

4.7.2.3 Livestock possession and knowledge

The livestock possession of the aromatic black rice growers had a significant association with the knowledge regarding the benefits provided by MOVCDS. The benefits provided by MOVCDS, such as financial assistance/ incentives for establishment of on-farm input production units requires possessing livestock to source the raw materials (farm yard manure). As a result, there exist a significant association between livestock possession of aromatic black rice growers with their knowledge regarding the benefits provided by MOVCDS.

Table 16: Association between profile characteristics of aromatic black rice growers with their knowledge regarding the benefits provided under MOVCDS

(n=180)

Sl. No.	Characteristics	Degree of freedom	Chi-square value	Contingency coefficient
1	Age	4	1.28^{NS}	0.03
2	Education	4	10.01*	0.28
3	Family size	4	2.68^{NS}	0.06
4	Land holding	4	7.01^{NS}	0.17
5	Annual income	4	7.68^{NS}	0.18
6	Fallow period	4	4.05^{NS}	0.09
7	Organic farming experience	4	11.39*	0.27
8	Livestock possession	4	10.92*	0.26
9	Material possession	4	2.69NS	0.06
10	Crop productivity	4	12.68*	0.27
11	Achievement motivation	4	10.61*	0.26
12	Aspiration	4	9.99*	0.24
13	Management orientation	4	11.21*	0.27
14	Economic motivation	4	12.12*	0.29
15	Risk orientation	4	13.01*	0.31
16	Innovative proneness	4	15.69**	0.38
17	Mass media exposure	4	10.62*	0.25
18	Training on organic farming	4	14.96**	0.36
19	Extension agency contact	4	15.99**	0.39
20	Extension participation	4	16.61**	0.40

NS= non-significant, *=Significant at 5%, **= Significant at 1%

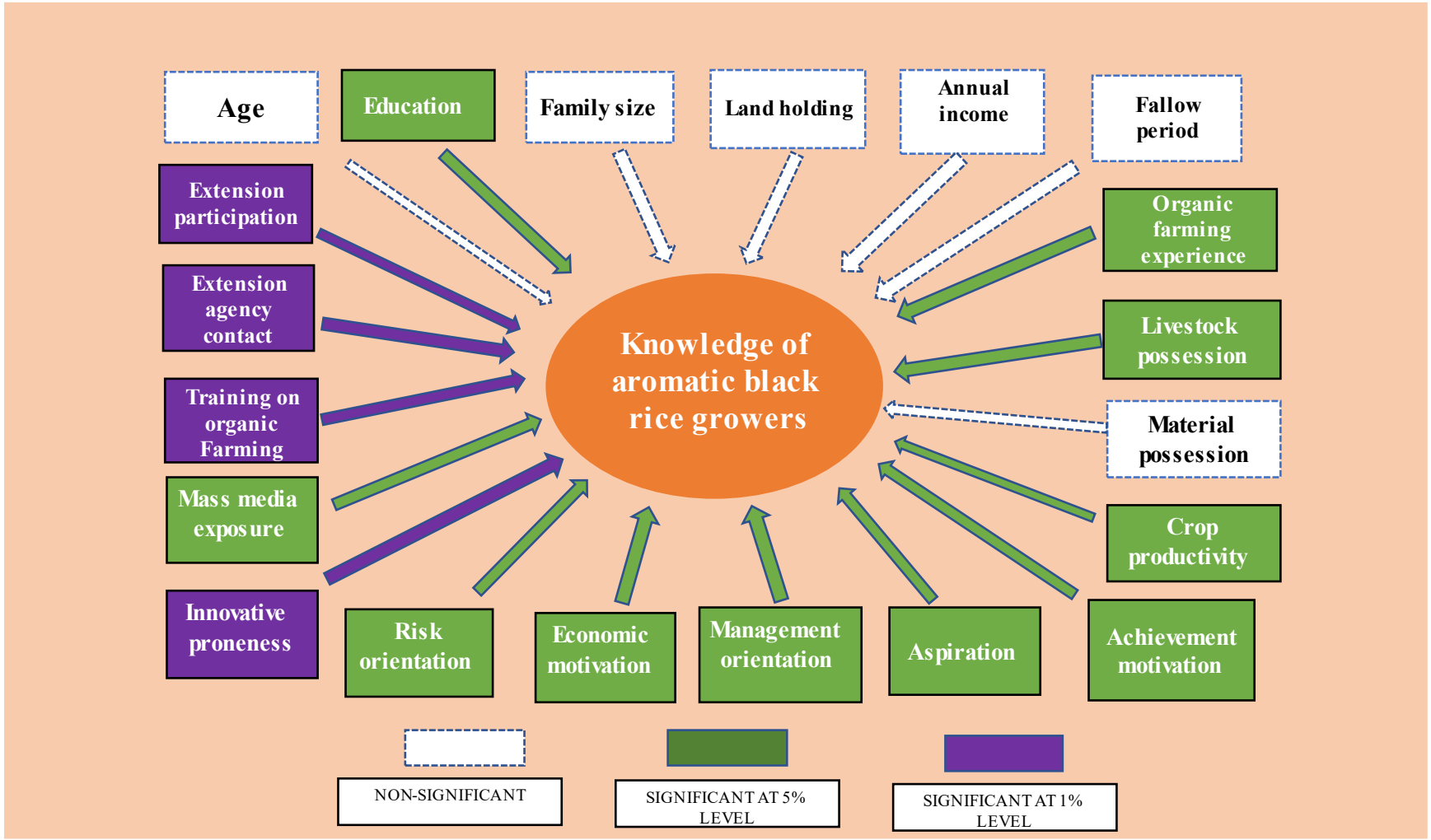

Fig. 16: Association between profile characteristics of aromatic black rice growers with their knowledge regarding the benefits provided under MOVCDS

4.7.2.4 Crop productivity and knowledge

The study revealed a significant association between crop productivity and knowledge of aromatic black rice growers regarding benefits provided under MOVCDS. The respondents with good knowledge on the benefits provided under MOVCDS have managed to obtain the financial assistance/ incentives for purchasing the organic agricultural inputs under the scheme and have contacted extension functionaries for getting technical assistance on organic farming practices. The use of incentives and adoption of organic farming technologies have resulted in getting increased yield, hence there exist a a significant association between crop productivity and knowledge of aromatic black rice growers regarding benefits provided under MOVCDS.

4.7.2.5 Achievement motivation and knowledge

Achievement motivation and knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS had a significant association. The aromatic black rice growers have excelled in knowing and obtaining the benefits of the MOVCDS by frequently contacting the extension functionaries and participation in agricultural extension activities organised under MOVCDS, as a result there is significant association exist between knowledge level and achievement motivation of aromatic black rice growers.

4.7.2.6 Aspiration and knowledge

Aspiration is the will of a person to excel in the activities they partake. The will to excel by the organic aromatic black rice drives them to seek information about the benefits provided under MOVCDS by associating themselves with the extension agents and in the activities of farmers interest group activities. Hence, significant association was observed between the aspiration of aromatic black rice growers with their knowledge regarding the benefits provided under MOVCDS.

4.7.2.7 Management orientation and knowledge

The probable reason for management orientation of aromatic black rice growers in having significant association with their knowledge regarding benefits provided under MOVCDS may be attributed to the gaining of managerial abilities on crop and resources

management by the respondents through the participation of extension activities (meetings/discussion, training programmes, field visits, demonstrations, exposure visits, etc) organized by MOVCDS. This has not only enhanced their managerial orientation but has also helped the aromatic black rice growers in getting good knowledge regarding the benefits provided under MOVCDS.

4.7.2.8 Economic motivation and knowledge

A significant association between economic motivation and knowledge regarding the benefits provided under MOVCDS was observed at five per cent level. Getting good income is the major driver to take up any farming activity. MOVCDS not only promotes the organic production of aromatic black rice but also buy back the aromatic black rice providing premium price. Hence, economic motivation and knowledge regarding the benefits provided under MOVCDS were significantly associated.

4.7.2.9 Risk orientation and knowledge

The active participation in MOVCDS activities enables aromatic black rice growers to acquaint them to the scheme giving them confidence to undertake risk in adopting the organic farming practices. This may be accounted for the significant association between risk orientation of the aromatic black rice growers and knowledge regarding the benefits provided under MOVCDS.

4.7.2.10 Innovative proneness and knowledge

Aromatic black rice growers who are innovative in adopting organic farming practices try to seek more information on the incentives provided under MOVCDS, hence there is a highly significant association exist between innovative proneness of aromatic black rice growers and their knowledge level regarding the benefits provided under MOVCDS.

4.7.2.11 Mass media exposure and knowledge

The MOVCDS has published /broadcasted/telecasted the benefits of MOVCDS in newspaper/radio/television, etc., for creating awareness among the aromatic black rice

growers. More exposure by the respondents to the mass media has facilitated the aromatic black rice growers in gaining knowledge regarding the benefits provided under MOVCDS. Hence, there is a significant association between knowledge regarding the benefits provided under MOVCDS and mass media exposure of aromatic black rice growers.

4.7.2.12 Training on organic farming and knowledge

A highly significant association between training on organic farming and knowledge regarding MOVCDS at one per cent level was obvious since training provides an opportunity for the farmers to gain knowledge on the organic farming practices and also it helps the farmers the procedure of getting the benefits of MOVCDS. Hence, training on organic farming and knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS was having highly significant association.

4.7.2.13 Extension agency contact and knowledge

Extension agency contact of aromatic black rice growers had a highly significant association with their knowledge regarding the benefits provided under MOVCDS. Regular contact with the agricultural extension workers has helped the respondents in knowing the benefits extending by the scheme for adopting organic farming practices in aromatic black rice, hence a highly significant association existed between the contact of extension agency of aromatic black rice growers with their knowledge regarding the benefits provided under MOVCDS.

4.7.2.14 Extension participation and knowledge

Extension participation and knowledge of the aromatic black rice growers regarding the benefits provided under MOVCDS had highly significant association. It is quite obvious, that the participation of the respondents in extension activities such as field visits, demonstrations, farm mela, exhibitions have helped them in gaining knowledge about the benefits provided under MOVCDS.

The hypothesis set for the research study *i.e.*, there is no association between the personal, socio-psychological and communication characteristics of aromatic black rice

growers with their knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS is partially rejected, since many of the profile characteristics of aromatic black rice growers had significant to highly significant association with the knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS.

4.7.3 Association between profile characteristics of aromatic black rice growers with their adoption of organic farming practices

The association between the profile characteristics with their adoption level of aromatic black rice growers are presented in Table 17 and Fig. 17.

Non-significant association exists between age, family size, land holding, annual income, fallow period and material possession of aromatic black rice growers with the adoption of organic farming practices, whereas education, organic farming experience, livestock possession, crop productivity, achievement motivation, aspiration, management orientation, economic motivation, mass media exposure, and training on organic farming of aromatic black rice growers had significant association with the adoption level at five per cent level. The variables such as, risk orientation, innovative proneness, extension agency contact and extension participation of aromatic black rice growers were having a highly significant association with the adoption level at one per cent level. Similar results were reported by Shashidhar (2006), Tanweer (2019) and Chaitra (2020). The reasons for the profile characteristics of aromatic black rice growers having significant and highly significant association with the adoption level are presented in the following paragraphs.

4.7.3.1 Education and adoption

The study revealed a significant association between education and adoption level of aromatic black rice growers at five per cent level. Formal schooling is a means of increasing the knowledge about different concepts, technologies etc. Schooling facilitates learning which in turn presumed to instil a favourable attitude among farmers towards the adoption of eco-friendly organic farming practices. Hence, there exist a significant association between education level of aromatic black rice growers and adoption level.

Table 17: Association between profile characteristics of aromatic black rice growers with their adoption of organic farming practices (n=180)

Sl. No.	Characteristics	Degree of freedom	Chi-square value	Contingency coefficient
1	Age	4	1.96^{NS}	0.07
2	Education	4	10.01*	0.38
3	Family size	4	2.68^{NS}	0.06
4	Land holding	4	3.19^{NS}	0.12
5	Annual income	4	4.01^{NS}	0.13
6	Fallow period	4	0.92^{NS}	0.02
7	Organic farming experience	4	11.22*	0.44
8	Livestock possession	4	10.90*	0.36
9	Material possession	4	2.81^{NS}	0.07
10	Crop productivity	4	9.91*	0.36
11	Achievement motivation	4	12.61*	0.35
12	Aspiration	4	10.68*	0.31
13	Management orientation	4	11.68*	0.30
14	Economic motivation	4	12.00*	0.32
15	Risk orientation	4	13.91**	0.33
16	Innovative proneness	4	14.01**	0.41
17	Mass media exposure	4	10.92*	0.35
18	Training on organic farming	4	14.91*	0.34
19	Extension agency contact	4	15.86**	0.38
20	Extension participation	4	17.28**	0.42

NS= Non-significant, *=Significant at 5%, **= Significant at 1%

4.7.3.2 Organic farming experience and adoption

The chi-square analysis revealed a significant association between organic farming experience and adoption level. Farmers who have cultivated aromatic black rice since previous years are aware of the adverse effects of practising intensive agriculture with more of agro-chemicals resulting in pollution and deterioration of soil health. This would have promoted them in joining the MOVCDS for deriving incentives and cultivating organically the aromatic black rice. Hence, significant association was found between the organic farming experience and adoption of organic farming practices by aromatic black rice growers.

4.7.3.3 Livestock possession and adoption

In organic agriculture, most of the organic inputs such as farm yard manure/ composts/biopesticides etc. are obtained from the livestock. Therefore, it is understandable that aromatic black rice growers with more livestock possession would have a better leverage in adopting organic agriculture. Hence, a significant association was observed between livestock possession and adopting level of aromatic black rice growers

4.7.3.4 Crop productivity and adoption

The study has revealed a significant association between crop productivity and adoption of organic practices by the aromatic black rice growers at five per cent level. The farmers who have registered for MOVCDS are advocated to follow organic farming practices. There is an increased rice yield as a result of adopting the recommended organic farming practices by the respondents, hence there is significant association exist between crop productivity and adoption of organic farming practices resulting in increased yield.

4.7.3.5 Achievement motivation and adoption

The chi-square analysis revealed that there exists a significant association between achievement motivation of aromatic black rice growers and the adoption level. Achievement motivation is the important determinant of excellence or perfection what one does. In order to attain this, the respondents might have learnt the organic farming practices

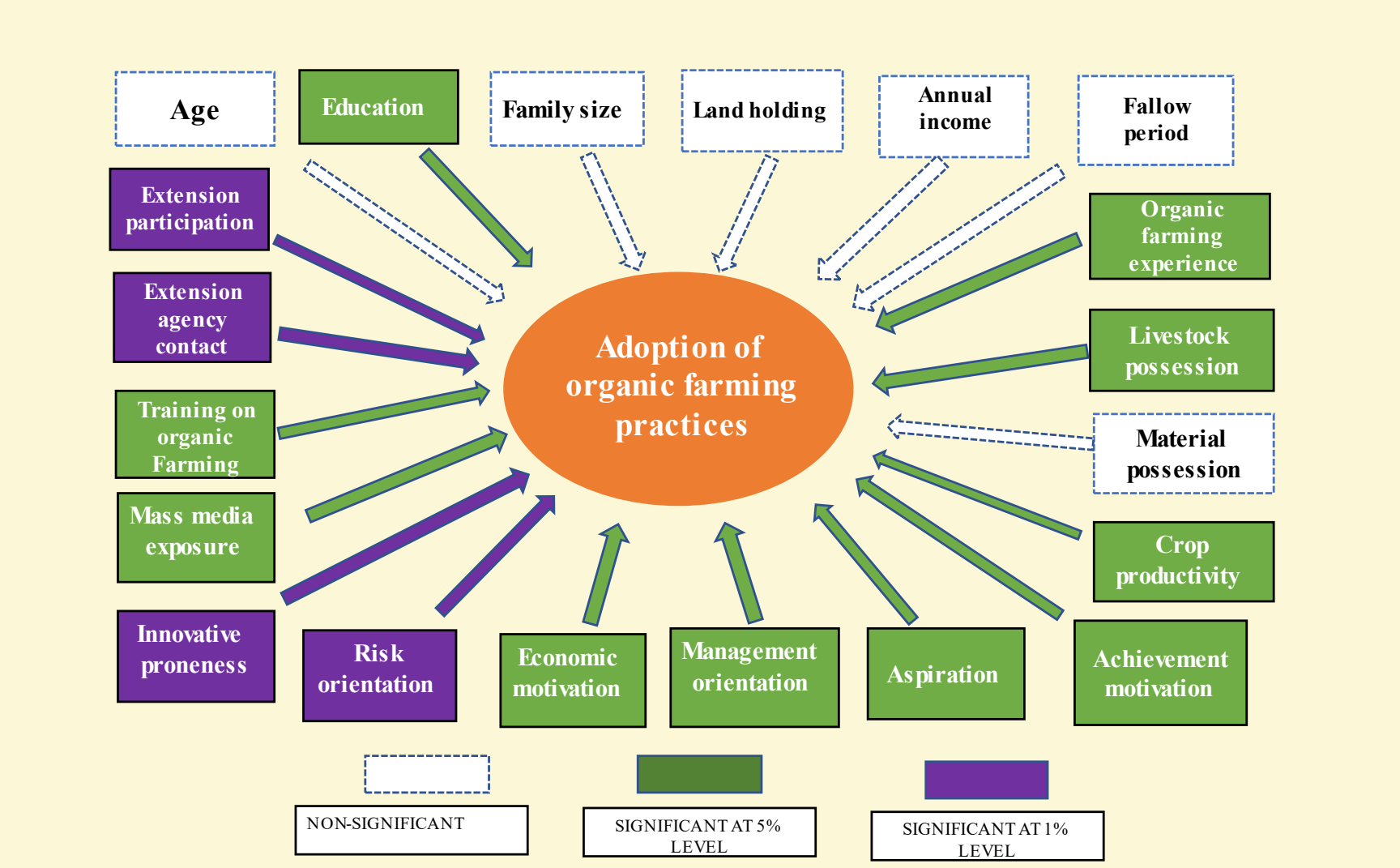

Fig. 17: Association between profile characteristics of aromatic black rice growers with the adoption of organic farming practices

meticulously and also might have practised it with adequate care obtaining maximize yield. Hence, a significant association exists between achievement motivation and adoption level.

4.7.3.6 Aspiration and adoption

Significant association exists between aspiration of aromatic black rice growers and adoption level. The respondents who aspire to improve their farming enterprise and to earn higher and sustained profits without affecting the soil fertility and environment, would naturally strive hard to practise the organic farming practices. Hence, a significant association exists between the aspiration of respondents with the adoption level.

4.7.3.7 Management orientation and adoption

A significant association between adoption level and management orientation of aromatic black rice growers was observed at five per cent level. Organic farming involves more stringent management of farm resources specially in terms of deriving resources from livestock waste and the ability for good planning and managing the crop by the farmers. Since aromatic black rice cultivation is being carried out by the respondents in leu of agro-chemicals, a more precise planning and management of crop is needed. Hence, the farmers with a high level of management orientation were found to have higher level of adoption of organic farming practices.

4.7.3.8 Economic motivation and adoption

Aromatic black rice growers have perceived economic returns without damaging their basic resources and thus, have opted for adopting the organic farming technologies advocated under MOVCDS. The respondents have also perceived that practising organic farming practices is also economical by saving money on agro-chemicals. Hence, there is an association between economic motivation of respondents with their adoption level.

4.7.3.9 Risk orientation and adoption

Risk orientation of aromatic black rice growers was having a highly significant association with the adoption level. The aromatic black rice growers are adopting organic cultivation practices as they perceive the possible benefits outweighs the risk associated

with the availability of organic agriculture inputs, pests and disease attack, price risk etc. Hence, farmers with higher level of risk orientation have adopted more number of organic farming practices in aromatic black rice.

4.7.3.10 Innovative proneness and adoption

Innovative proneness of the aromatic black rice growers was found to be having highly significant association with adoption level. Innovative proneness is associated with accepting change leading to adoption of innovative and scientific organic farming practices. The aromatic black rice growers had perceived that the organic farming practices advocated under MOVCDS are new to them and they have adopted the same in their rice fields for obtaining increased crop yield and income.

4.7.3.11 Mass media exposure and adoption

It was analysed that mass media exposure of aromatic black rice growers and adoption of organic farming practices had significant association at five per cent level. High level of mass media exposure of the respondents would facilitate in developing habits to gather more information about organic farming practices through television, farm magazine, internet, radio, newspaper and other literature. Such farmers readily accept and adopt the organic farming practices in their fields. Hence, mass media exposure of aromatic black rice growers had significant association with their adoption level.

4.7.3.12 Training on organic farming and adoption

Training on organic farming was having a significant association with the adoption level of aromatic black rice growers. Training provides an opportunity to the trainees for gaining knowledge about the organic farming practices, which leads to the adoption of the same in their fields to realise increase crop yield and profits. Hence, there is significant association between the training on organic farming of aromatic black rice growers and adoption level.

4.7.3.13 Extension agency contact and adoption

Extension agency contact of aromatic black rice growers had highly significant association with their adoption level. Extension professionals communicate the latest developments in agriculture research laboratories and the developments in other farmers fields. Hence, the respondents with high level of extension agency contact will consequently adopt the organic farming practices advocated under MOVCDS.

4.7.3.14 Extension participation and adoption

It was found that extension participation of aromatic black rice growers had highly significant association with the adoption level. Participation of aromatic black rice growers in extension activities conducted by MOVCDS promotes the acquisition of gaining knowledge about organic farming practices leading to the adoption of such technologies in the rice field. Hence, there was a highly significant association exist between the extension agency contact of the aromatic black rice growers and adoption level.

The results of the research study have revealed that many of the profile characteristics of aromatic black rice growers had significant and highly significant association with adoption level. Therefore, the hypothesis set forth for the study i.e., there is no association between the profile characteristics of aromatic black rice growers with adoption level is partially rejected.

4.8. Extent of contribution of profile characteristics of aromatic black rice growers on the perception, knowledge and adoption level

The findings in Table 18, 19 and 20 presents the data on the extent of contribution of profile characteristics of aromatic black rice growers on the perception, knowledge and adoption level. Multiple regression analysis was used to find out the extent of contribution of profile characteristics of aromatic black rice growers on their perception, knowledge and adoption level.

4.8.1. Extent of contribution of profile characteristics of aromatic black rice growers on the perception towards MOVCDS

A perusal of Table 18 reveals that 14 profile characteristics of aromatic black rice growers (education, organic farming experience, livestock possession, crop productivity, achievement motivation, aspiration, management orientation, economic motivation, risk orientation, innovative proneness, mass media exposure, training on organic farming, extension participation and extension agency contact) were significantly contributing to the development of better perception towards MOVCDS. All the 20 independent variables have contributed to the tune of 71.69 per cent (R^2= 0.7169) in developing better perception of aromatic black rice growers towards MOVCDS. It is evident that variables such as, education, organic farming experience, livestock possession, crop productivity, achievement motivation, aspiration, management orientation, economic motivation, risk orientation, innovative proneness, mass media exposure, training on organic farming, extension agency contact and extension participation have contributed immensely in developing better perception of aromatic black rice growers towards MOVCDS.

4.8.2. Extent of contribution of profile characteristics of aromatic black rice growers on the knowledge regarding the benefits provided under MOVCDS

Education, organic farming experience, livestock possession, crop productivity, achievement motivation, aspiration, management orientation, economic motivation, risk orientation, innovative proneness, mass media exposure, training on organic farming, extension participation and extension agency contact of aromatic black rice growers had significantly contributed in developing high knowledge level towards the benefits provided under MOVCDS (Table 19). All the 20 variables selected for the research study together have contributed to 70.68 per cent (R^2= 0.7068) in developing high knowledge regarding the benefits provided under MOVCDS. Other six variables, namely age, family size, land holding, fallow period, annual income, and material possession had no significant association with the knowledge regarding the benefits provided under MOVCDS. It could be concluded that education, organic farming experience, livestock possession, crop productivity, achievement motivation, aspiration, management orientation, economic motivation, risk orientation, innovative proneness, mass media exposure, training on

Table 18: Extent of contribution of the profile characteristics of aromatic black rice growers on the perception towards MOVCDS (n=180)

Sl. No.	Characteristics	Regression coefficient	SE of Regression coefficient	't' value
1	Age	0.06	0.12	0.51^{NS}
2	Education	0.31	0.69	2.21*
3	Family size	0.32	0.09	0.28^{NS}
4	Land holding	0.47	0.18	0.38^{NS}
5	Annual income	0.50	0.21	0.42^{NS}
6	Fallow period	0.41	0.22	0.53^{NS}
7	Organic farming experience	0.32	0.72	2.21*
8	Livestock possession	0.30	0.70	2.33*
9	Material possession	0.19	0.18	0.92^{NS}
10	Crop productivity	0.07	0.20	2.52*
11	Achievement motivation	0.35	0.81	2.31*
12	Aspiration	0.24	0.59	2.42*
13	Management orientation	0.34	0.72	2.11*
14	Economic motivation	0.30	0.69	2.33*
15	Risk orientation	0.32	0.70	2.16*
16	Innovative proneness	0.35	0.69	2.00*
17	Mass media exposure	0.29	0.72	2.44*
18	Training on organic farming	0.32	0.81	2.50*
19	Extension agency contact	0.29	0.89	3.01*
20	Extension participation	0.36	0.92	2.51*

NS= Non-significant, *=Significant at 5%, **= Significant at 1%, $R^2 = 0.7169$

Table 19: Extent of contribution of the profile characteristics of aromatic black rice growers on the knowledge regarding the benefits provided under MOVCDS (n=180)

Sl. No.	Characteristics	Regression coefficient	SE of Regression coefficient	't' value
1	Age	0.87	0.28	0.32^{NS}
2	Education	0.33	0.71	2.11*
3	Family size	0.94	0.22	0.23^{NS}
4	Land holding	0.26	0.11	0.41^{NS}
5	Annual income	0.51	0.20	0.39^{NS}
6	Fallow period	0.90	0.09	0.10^{NS}
7	Organic farming experience	0.29	0.62	2.11*
8	Livestock possession	0.31	0.71	2.23*
9	Material possession	0.16	0.11	0.69^{NS}
10	Crop productivity	0.06	0.13	2.08*
11	Achievement motivation	0.36	0.81	2.23*
12	Aspiration	0.31	0.68	2.18*
13	Management orientation	0.28	0.70	2.50*
14	Economic motivation	0.27	0.69	2.44*
15	Risk orientation	0.28	0.72	2.51*
16	Innovative proneness	0.33	0.68	2.01*
17	Mass media exposure	0.29	0.71	2.48*
18	Training on organic farming	0.37	0.82	2.21*
19	Extension agency contact	0.43	0.91	2.09*
20	Extension participation	0.29	0.88	2.09*

NS= Non-significant, *=Significant at 5%, **= Significant at 1% , $R^2 = 0.7068$

organic farming, extension participation and extension agency contact have synergic effect on one another influencing the aromatic black rice growers in increasing the knowledge level regarding the benefits provided under MOVCDS.

4.8.3. Extent of contribution of profile characteristics of aromatic black rice growers on the adoption of organic farming practices

Seven independent variables viz., age, family size, land holding, annual income, fallow period, material possession and crop productivity had not significantly contributed in the adoption of organic farming technologies by aromatic black rice growers, whereas the remaining 13 independent variables, namely education, organic farming experience, livestock possession, achievement motivation, aspiration, management orientation, economic motivation, risk orientation, innovative proneness, mass media exposure, training on organic farming, extension participation and extension agency contact were significantly contributing to the adoption of organic farming practices (Table 20). The results in table also reveals that 20 profile characteristics have contributed to 73.88 per cent in the variation in respect of the adoption of organic farming technologies. It could be summarized from the above research results that education, organic farming experience, livestock possession, achievement motivation, aspiration, management orientation, economic motivation, risk orientation, innovative proneness, mass media exposure, training on organic farming, extension participation and extension agency contact of aromatic black rice growers have directly influenced the adoption of organic farming practices.

4.9. Direct, indirect and largest indirect effects of profile characteristics of aromatic black rice growers on the perception, knowledge and adoption level.

Tables 21, 22 and 23 presents the data on the direct, indirect and largest indirect effects of profile characteristics of aromatic black rice growers on perception, knowledge and adoption level. Path analysis was employed to know the direct, indirect and largest indirect effects of profile characteristics of aromatic black rice growers on perception, knowledge and adoption level. A total of 14 independent variables which were having significant and highly significant association with the dependent variables such as,

Table 20: Extent of contribution of the profile characteristics on the adoption of aromatic black rice growers (n=180)

Sl. No.	Characteristics	Regression coefficient	SE of Regression coefficient	't' value
1	Age	0.25	0.22	0.88^{NS}
2	Education	0.34	0.68	1.99*
3	Family size	0.31	0.19	0.61^{NS}
4	Land holding	0.75	0.09	0.12^{NS}
5	Annual income	0.30	0.11	0.36^{NS}
6	Fallow period	0.31	0.13	0.42^{NS}
7	Organic farming experience	0.41	0.81	2.00*
8	Livestock possession	0.33	0.71	2.11*
9	Material possession	0.48	0.20	0.41^{NS}
10	Crop productivity	0.19	0.18	0.91^{NS}
11	Achievement motivation	0.28	0.69	2.48*
12	Aspiration	0.33	0.66	1.98*
13	Management orientation	0.36	0.78	2.16*
14	Economic motivation	0.32	0.69	2.11*
15	Risk orientation	0.33	0.81	2.48*
16	Innovative proneness	0.22	0.69	3.01**
17	Mass media exposure	0.33	0.77	2.33**
18	Training on organic farming	0.43	0.92	2.11*
19	Extension agency contact	0.40	0.81	2.00*
20	Extension participation	0.28	0.88	3.09**

NS= Non-significant, *=Significant at 5%, **= Significant at 1%, R^2= 0.7388

perception, knowledge and adoption level were considered for path analysis. The variables chosen for the path analysis are: education (X1), organic farming experience (X2), livestock possession (X3), crop productivity (X4), achievement motivation (X5), aspiration (X6), management orientation (X7), economic motivation (X8), risk orientation (X9), innovative proneness (X10), mass media exposure (X11), training on organic farming (X12), extension agency contact (X13) and extension participation (14).

4.9.1 Direct, indirect and largest direct effects of profile characteristics of aromatic black rice growers on the perception towards MOVCDS

The path co-efficient of profile characteristics of aromatic black rice growers with respect to their direct effects, total indirect effects and largest indirect effects channelled through other independent variables on the perception towards MOVCDS are presented in Table 21 and Fig 18.

Ranking the variables based on their direct effect on perception towards MOVCDS revealed that extension agency contact (X13), extension participation (X14), training on organic farming (X12), and innovative proneness (X4), occupied the first four ranks in that order, whereas mass media exposure (X11), organic farming experience (X12), livestock possession (X13) and crop productivity (X14) obtained the last four ranks in the same order. The ranking of variables on their indirect effect on the perception towards MOVCDS, reveals that training on organic farming (X12), extension agency contact (X13), extension participation (14) and innovative proneness (X4) occupied the first four ranks in the order of magnitude, while variables such as, organic farming experience (X2), economic motivation (X12), livestock possession (X3) and crop productivity (X14) occupied the last four ranks in the order of magnitude.

The first largest indirect effect channelled through is extension participation (X14) in the case of six variables, followed by training on organic farming (X12) was channelled through three variables and extension agency contact (X13) was channelled through two variables. The second largest indirect effect channelled through training on organic farming (X12) in case of six variables, while training on organic farming (X12) was channeled through three variables and extension agency contact (X13) was channeled through two

Table 21: Direct, indirect and largest indirect effects of profile characteristics of aromatic black rice growers on the perception towards MOVCDS

(n=180)

Sl. No.	Characteristics	Direct effect	Rank	Total Indirect Effect	Rank	Three largest indirect effects channelled through
X_1	Education	0.0499	6	0.0222	10	0.516 X14
						0.312 X12
						0.121 X13
X_2	Organic farming experience	0.0211	12	0.0211	11	0.121 X14
						0.120 X12
						0.009 X5
X_3	Livestock possession	0.0199	13	0.0091	13	0.128 X14
						0.111 X12
						0. 009 X5
X_4	Crop productivity	0.0188	14	0.0081	14	0.232 X14
						0.200 X12
						0.199 X6
X_5	Achievement motivation	0.0611	5	0.0491	7	0.399 X14
						0.269 X12
						0.139 X10
X_6	Aspiration	0.0419	7	0.0401	8	0.123 X14
						0.100 X12
						0.091 X7
X_7	Management orientation	0.0392	8	0.0398	9	0.123 X12
						0.120 X14
						0.090 X6
X_8	Economic motivation	0.0291	10	0.0198	12	0.222 X12
						0.200 X14
						0.191 X13
X_9	Risk orientation	0.0333	9	0.0599	6	0.351 X12
						0. 301 X14
						0.191 X13
X_{10}	Innovative proneness	0.0666	4	0.0792	4	0.401 X13
						0.391 X1
						0.201 X12
X_{11}	Mass media exposure	0.0222	11	0.0601	5	0.268 X13
						0.238 X10
						0.211 X12
X_{12}	Training on organic farming	0.0792	3	0.0991	1	0.391 X10
						0.301 X13
						0.300 X1
X_{13}	Extension agency contact	0.0888	1	0.0911	2	0.562 X11
						0.461 X9
						0.222 X12
X_{14}	Extension participation	0.0871	2	0.0899	3	0.261 X10
						0.201 X13
						0.199 X1

Residual effect =0.2831

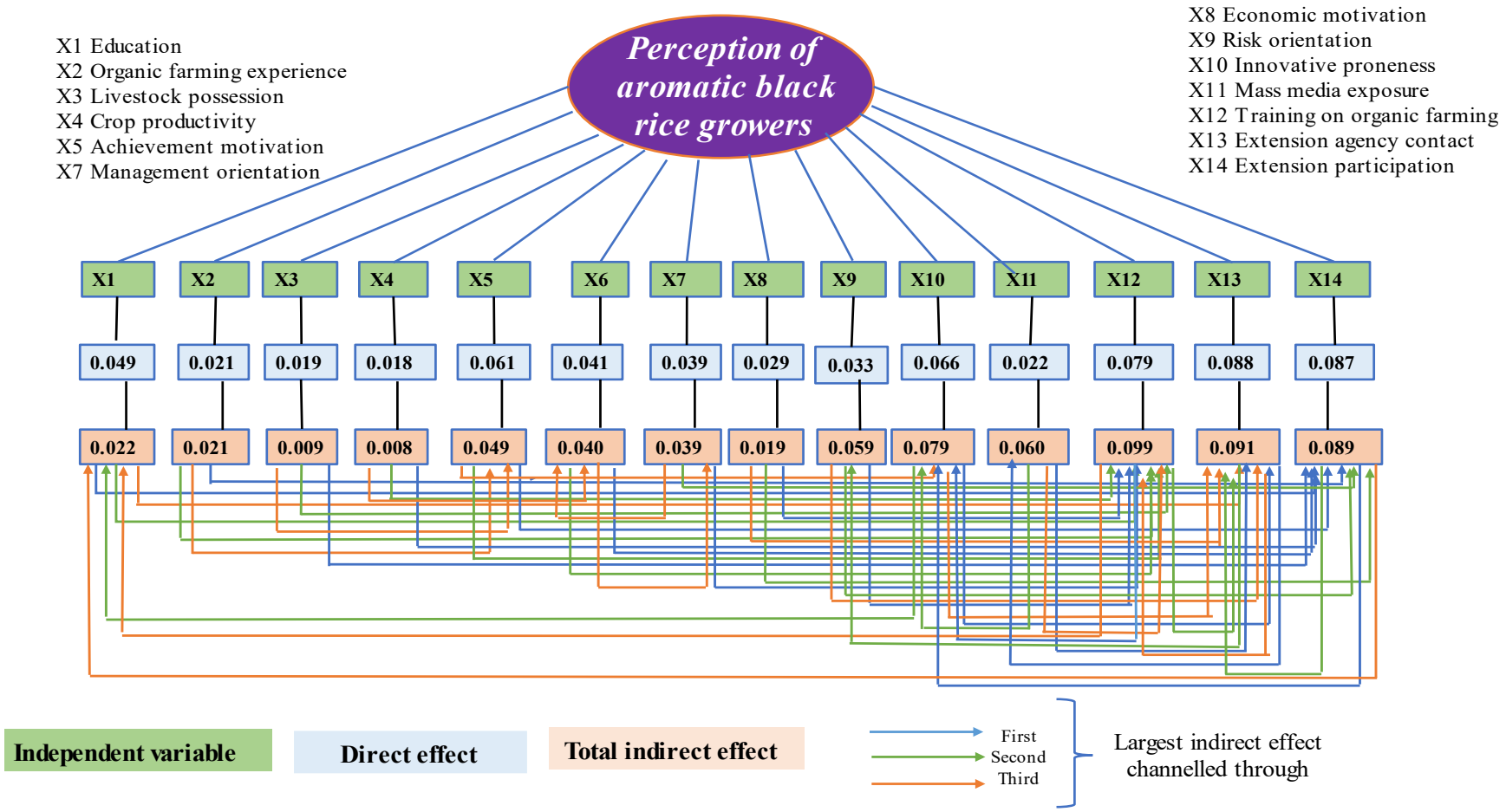

Fig. 18: Direct, indirect and largest indirect effects of the profile characteristics of aromatic black rice growers on the perception towards MOVCDS

variables. In respect of the third largest indirect effect channeled through is training on organic farming (X12) in case of four variables, while extension agency contact (X13) and extension participation (X14) was channelled in case of three and two variables, respectively. The total residual effect of the path analysis was 0.2831.

The results of the path analysis revealed that three variables namely, extension agency contact, extension participation and training on organic farming were found not only having major direct effect on the perception towards MOVCDS, but also having indirect and largest indirect effects in developing better perception of aromatic black rice growers towards MOVCDS.

4.9.2. Direct, indirect and largest indirect effects of profile characteristics of aromatic black rice growers on the knowledge regarding the benefits provided under MOVCDS

Table 22 and Fig. 19 present the data on the path co-efficient of profile characteristics of aromatic black rice growers with respect to their direct effects, total indirect effects and largest indirect effects channeled through other independent variables on knowledge regarding the benefits provided under MOVCDS**.**

With respect to the ranking of variables on the basis of their direct effect on knowledge regarding the benefits provided under MOVCDS, it was found that extension agency contact (X13), extension participation (X14), training on organic farming (X12), and innovative proneness (X4) occupied the first four ranks in the order of importance, whereas risk orientation (X9), economic motivation (X8), livestock possession (X13) and crop productivity (X14) obtained the last four ranks in the order of importance. The ranking of variables on their indirect effect on the knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS, revealed that the extension participation (X14), extension agency contact (X13), training on organic farming (X12), and innovative proneness (X4) occupied the first four ranks in the order of magnitude, while variables such as, mass media exposure (X11), economic motivation (X12), livestock possession (X3) and crop productivity (X14) occupied the last four ranks in the order of magnitude.

Table 22: Direct, indirect, and largest indirect effects of profile characteristics of aromatic black rice growers on the knowledge regarding the benefits provided under MOVCDS (n=180)

Sl. No.	Characteristics	Direct effect	Rank	Total Indirect Effect	Rank	Three largest indirect effects channelled through
X_1	Education	0.0211	10	0.0312	9	0.174 X13
						0.160 X10
						0.090 X14
X_2	Organic farming experience	0.0400	6	0.0592	6	0.264 X13
						0.250 X14
						0.111 X12
X_3	Livestock possession	0.0091	13	0.0111	13	0.236 X13
						0.211 X14
						0.091 X12
X_4	Crop productivity	0.0081	14	0.0100	14	0.311 X10
						0.291 X13
						0.111 X12
X_5	Achievement motivation	0.0391	7	0.0699	5	0.121 X13
						0.091 X7
						0.009 X12
X_6	Aspiration	0.0311	8	0.0561	7	0.412 X13
						0.091 X4
						0.081 X14
X_7	Management orientation	0.0299	9	0.0492	8	0.316 X13
						0.296 X10
						0.199 X14
X_8	Economic motivation	0.0101	12	0.0277	12	0.534 X12
						0.128 X14
						0.121 X13
X_9	Risk orientation	0.0209	11	0.0292	10	0.388 X14
						0.261 X13
						0.111 X12
X_{10}	Innovative proneness	0.0522	4	0.0791	4	0.128 X5
						0.122 X14
						0.098 X13
X_{11}	Mass media exposure	0.0413	5	0.0291	11	0.351 X13
						0.291 X14
						0.211 X1
X_{12}	Training on organic farming	0.0690	3	0.0801	3	0.111 X12
						0.110 X13
						0.089 X1
X_{13}	Extension agency contact	0.710	1	0.0899	2	0.429 X14
						0.291 X10
						0.111 X9
X_{14}	Extension participation	0.699	2	0.0911	1	0.009 X12
						0.008 X13
						0.001 X10

Residual effect = 0.2993

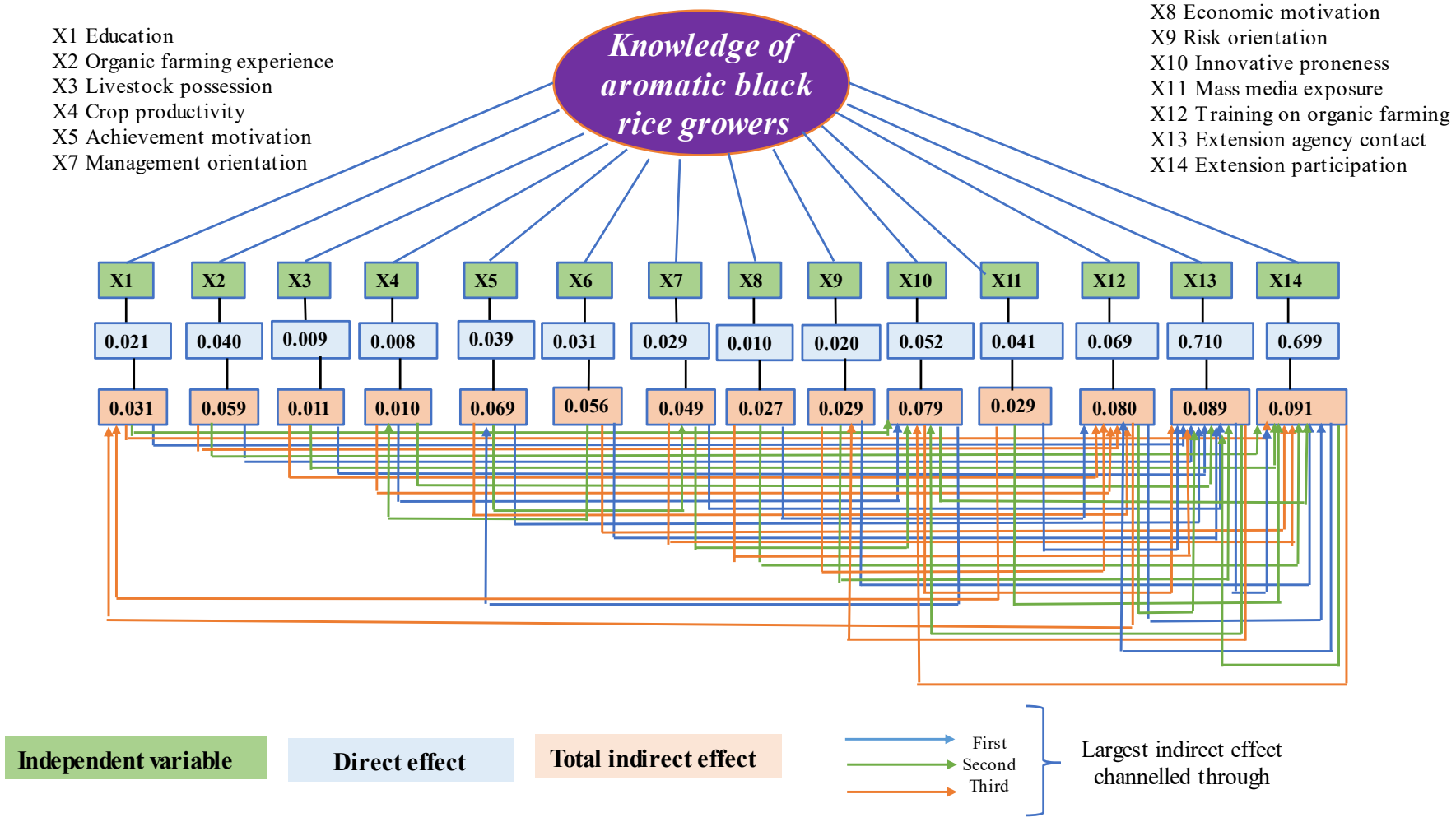

Fig. 19: Direct, indirect and largest indirect effects of the profile characteristics of aromatic black rice growers on the knowledge regarding benefits provided under MOVCDS

The first largest indirect effect channelled through is extension agency contact (X13) in the case of seven variables, closely followed by training on organic farming (X12) was channelled through three variables and extension participation (X12) was channelled through two variables. The second largest indirect effect channelled through was extension participation (X14) in case of five variables, while extension agency contact (X13) was channeled through four variables and innovative proneness (X10) was channeled through two variables. In respect of the third largest indirect effect channeled through is training on organic farming (X12) in case of five variables, while extension participation (X14) and extension agency contact (X13) was channeled in case of three and two variables, respectively. The total residual effect was 0.2993.

The results of the path analysis revealed that three variables namely, extension agency contact, extension participation and training on organic farming were having major direct, indirect effect and the largest indirect effects in enhancing the knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS.

4.9.3 Direct, indirect, and largest indirect effects of profile characteristics of aromatic black rice growers on the adoption of organic farming practices

The path co-efficient of profile of aromatic black rice growers with respect to their direct effects, total indirect effects and largest indirect effects channeled through other independent variables on adoption of organic farming practices are presented in Table 23 and Fig. 20.

In respect of ranking the variables on the basis of their direct effect on the adoption of organic farming practices by the aromatic black rice growers, it was observed that extension agency contact (X13), training on organic farming (X12), extension participation (X14), and innovative proneness (X4), occupied the first four ranks in the order of importance, while management orientation (X7), risk orientation (X9), economic motivation (X8), and livestock possession (X13) obtained the last four ranks in the order of importance. The ranking of variables on their indirect effect on the adoption of organic farming practices by the aromatic black rice growers reveals that extension participation (14), extension agency contact (X13), training on organic farming (X12), and innovative

Table 23: Direct, indirect, and largest indirect effects of profile characteristics of aromatic black rice growers on the adoption of organic farming practices

(n=180)

Sl. No.	Characteristics	Direct effect	Rank	Total Indirect Effect	Rank	Three largest indirect effects channelled through
X_1	Education	0.0491	7	0.0501	9	0.444 X13
						0.319 X12
						0.220 X10
X_2	Organic farming experience	0.0666	5	0.0799	6	0.112 X13
						0.110 X14
						0.090 X12
X_3	Livestock possession	0.0119	14	0.0192	14	0.121 X13
						0.111 X14
						0.009 X12
X_4	Crop productivity	0.0595	6	0.0817	5	0.039 X13
						0.021 X14
						0.009 X12
X_5	Achievement motivation	0.0399	8	0.0698	7	0.381 X13
						0.291 X14
						0.111 X12
X_6	Aspiration	0.0317	9	0.0511	8	0.293 X13
						0.213 X12
						0.191 X1
X_7	Management orientation	0.0300	11	0.0301	11	0.192 X14
						0.111 X13
						0.009 X5
X_8	Economic motivation	0.0211	13	0.0211	13	0.351 X14
						0.222 X13
						0.091 X11
X_9	Risk orientation	0.0292	12	0.0401	10	0.280 X14
						0.219 X13
						0.001 X1
X_{10}	Innovative proneness	0.0777	4	0.0881	4	0.391 X14
						0.311 X13
						0.291 X1
X_{11}	Mass media exposure	0.0316	10	0.0292	12	0.190 X12
						0.181 X1
						0.171 X13
X_{12}	Training on organic farming	0.0899	2	0.0900	3	0.222 X10
						0.181 X1
						0.169 X13
X_{13}	Extension agency contact	0.0911	1	0.0902	2	0.220 X12
						0.201 X14
						0.102 X2
X_{14}	Extension participation	0.0810	3	0.0912	1	0.191 X12
						0.089 X1
						0.007 X13

Residual effect = 0.2612

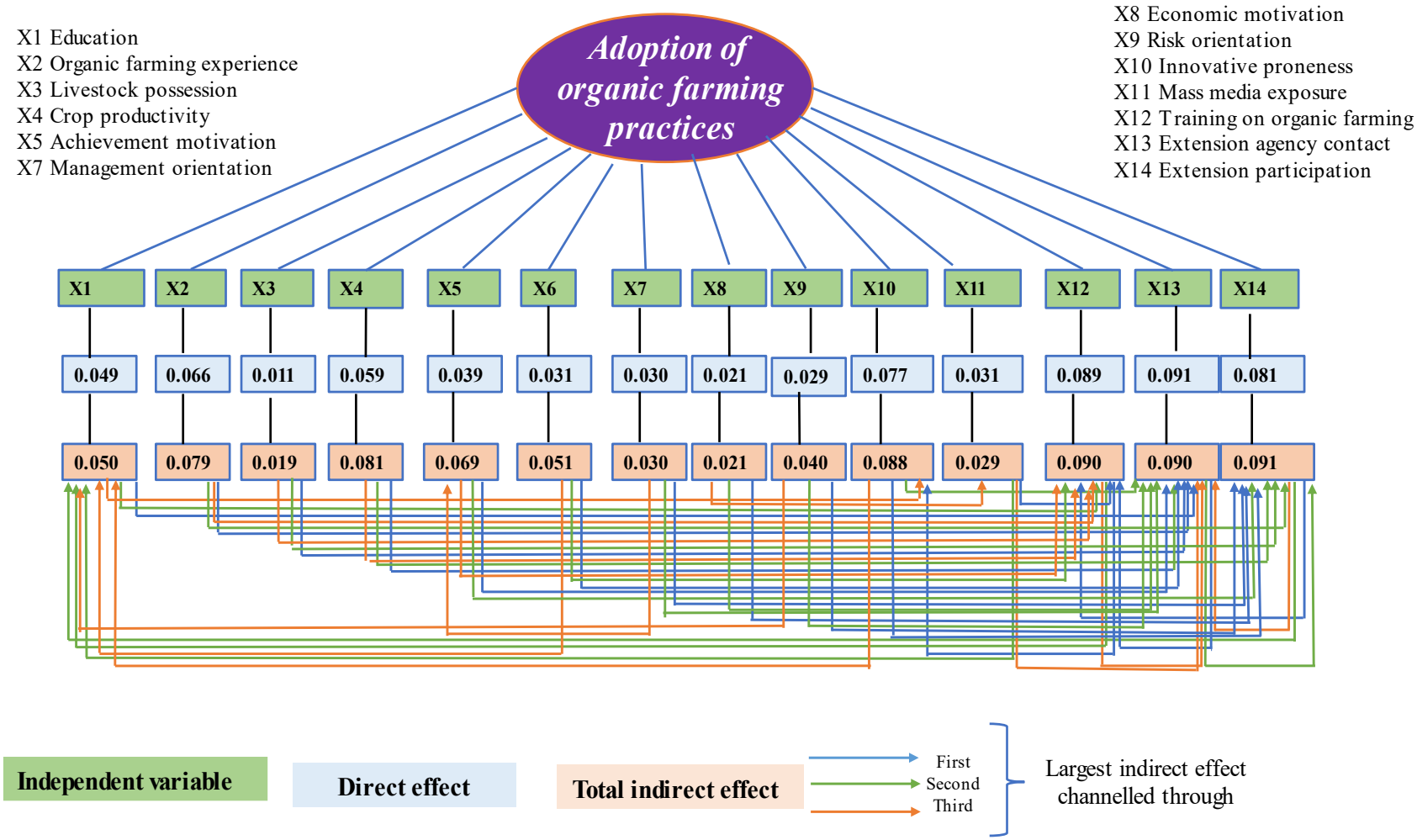

Fig. 20: Direct, indirect and largest indirect effects of the profile characteristics of aromatic black rice growers on the adoption of organic farming practices

proneness (X4) occupied the first four ranks in the order of magnitude, on the contrary variables such as, management orientation (X7), mass media exposure (X11), economic motivation (X12), and livestock possession (X3) occupied the last four ranks in the order of magnitude.

The first largest indirect effect channelled through is extension agency contact (X13) was in the case of six variables, followed by extension participation (X12) was channelled through four variables and training on organic farming (X12) was channelled through three variables. The second largest indirect effect was channelled through extension participation (X14) in case of five variables, while extension agency contact (X13) was channeled through four variables and education (X1) was channeled through three variables. In respect of the third largest indirect effect channeled through is training on organic farming (X12) in case of four variables, while education (X1) and extension agency contact (X13) was channelled in case of four and three variables, respectively. The total residual effect of the path analysis is 0.2612.

Training on organic farming, extension participation and extension agency contact were having the direct effect, indirect effect and largest indirect effect in increasing the improving the level of adoption of organic farming practices by the aromatic black rice growers.

The results in Tables 21, 22 and 23 revealed that the extension agency contact, extension participation and training on organic farming were found to be having the direct effect, indirect effect and largest indirect effect in developing better perception towards MOVCDS and increasing the knowledge regarding the benefits provided under MOVCDS and adoption of organic farming practices by the aromatic black rice growers.

4.10. Documentation of case studies of successful aromatic black rice growers

As a part of the research, four successful aromatic black rice growers who had got increased crop yield by adopting the organic farming practices advocated under MOVCDS were interviewed. Their testament of the success and positive changes they were able to achieve in life after joining MOVCDS are presented in the following paragraphs:

4.10.1. Case study- 1

General information

i. Name of the respondent : Thangjam Amuchou Singh

ii. Age : 61 years

iii. Education : Matriculation

iv. Name of the village : Irengbam

v. Cluster name : Irengbam cluster

vi. District : Bishnupur

With an educational qualification up to matriculation, Mr. Thangjam Amuchou Singh with a family of five members prior to joining MOVCDS was formerly depended on rice cultivation and working hard in his field for his family survival. He recalls that agriculture had always been his way of life. As a dedicated farmer that he was, Amuchou emphasised on the importance of maintaining a close contact with the Department of Agriculture, Manipur.

Even though he was aware about organic agriculture he was not keen in taking it up because of the risk that associates with it. His mis-conceptions were rectified after coming across the promotional activities conducted by MOVCDS regarding organic cultivation of aromatic black rice in the television. He recalls that the main inspiration for him in registering for MOVCDS was because of the message and intent the scheme carries. He was appreciative of the efforts of MOVCD, which made in trying to promote aromatic black rice (chak-hao), a crop, so closely knit with the Meitei tradition and culture.

After joining MOVCDS, Amuchou now grows black rice in an area of 2.5 acre and gets a yield of 14.6 q/ acre. He acknowledges the various extension support he received via the scheme and credits the institutional support that he received for the success. He earns a net income of Rs. 63,680/acre from aromatic black rice alone. Prior to MOVCDS, he has not experienced such growth in income. He mentioned that after attending as many as five training on organic farming conducted under MOVCDS not only did he learned about

organic agriculture but he was also able to learn about the various value addition and branding activities by frequently contacting agricultural extension functionaries and regularly participating in the extension activities. Under MOVCDS he is able to send his organic black rice produce to 'Rima Foods', wherein his produces are further processed and sent to the market.

With the income he was able to generate after joining MOVCDS, Mr. Amuchou was able to afford to buy a four-wheeler and was able to assist in his granddaughter's education. After witnessing the increase in income and with his misconceptions about organic agriculture being cleared up, he further wishes to expand the area of cultivation for organic aromatic black rice.

4.10.2. Case study- 2

General information

i. Name of the respondent : Konjengbam Nimaichand Singh
ii. Age : 64 years old
iii. Education : Matriculation
iv. Name of the village : Moirang Oaksongbung
v. Cluster name : Moirang A cluster
vi. District : Bishnupur

Mr. Konjengbam Nimaichand Singh is a resident of Moirang Oaksongbung village near the vicinity of Loktak lake has a land holding of 5 acre, where he mostly grow aromatic black rice. The main income throughout his life have been the source from agriculture.

He got to know about the scheme after attending an organic awareness camp conducted by Manipur Organic Mission Agency under MOVCDS. He recalls that he was interested in organic agriculture even before MOVCDS came into the picture. The main reason behind his interest was that he wanted his family and the society to consume healthier and chemical free food.

Prior to joining MOVCDS he had attempted growing his crops organically but was not successful as he could not receive proper guidance on resource management and crop maintenance for organic farming. But despite the bitter experience, he registered for the scheme after realising the various benefits/incentives provided under the scheme and the provision of buy back arrangement of the produce.

Mr. Nimaichand, before joining MOVCDS, he cultivated aromatic black rice on a small plot of land for household consumption but he now grows aromatic black rice organically in an area of 3.5 acre, under the guidance of various crop experts of MOVCDS. The crop has yielded 13.7 q/acre of aromatic black rice and earns a net income of Rs. 58,460/acre from his aromatic black rice production.

Realising the importance of organic manure to meet the nutrient needs of his crops, he invested the income received from his black rice cultivation into buying more livestock for getting farm yard manure and milk. Presently he owns 10 cows. He is now not only able to suffice the manure needs, but is also able to extend and share his manure with his fellow farmer interest group members. He now is not only a successful aromatic black rice grower but also an input provider for many other famers like him.

4.10.3. Case study- 3

General information

i. Name of the respondent : Khumucham Nando Singh

ii. Age : 46 years old

iii. Education : Graduate

iv. Name of the village : Kakching khunou

v. Cluster name : Kakching Khunou B Cluster

vi. District : Thoubal

With an educational qualification of graduation level, Mr. Khumucham Nando Singh owns a land holding of 4.75 acre of land and belongs to a small sized family

comprising of 6 members. Prior to MOVCDS, he was not able to obtain profit from agriculture to an extent that he considered shifting from agriculture to fishery.

Mr. Nando got the awareness about the scheme through his colleagues who passed on the information regarding the scheme. At first, despite his high innovative proneness, aspiration and economic motivation to bring positive change to his family's economic state, he was sceptical on getting involved with the scheme because of the risk involved in organic farming. On top of that he was not in a position to cope with the possible of getting reduced yield practising organic farming. Despite these, he was convinced to register under the scheme because of the various incentives and financial assistance provided under MOVCDS. What grabbed his interest was the marketing aspects of the scheme, where the sales of the produces seemed assured.

After registering with MOVCDS, he received assistance from the scheme in forms of direct benefit transfer, supply of seeds for the first year of cultivation and continued extension advisory services. He mentioned that he frequently was in contact with the technical staffs of Manipur Organic Mission Agency (the nodal agency of MOVCDS) and Green Foundation (the service providers) and regularly participating in the extension activities of the MOVCDS.

Prior to joining MOVCDS, he grew aromatic black rice on a small patch of land less than 0.5 acre, because he was not aware about the increasing demands of the aromatic black rice in the local as well as distant market. After joining the scheme, he cultivates organic aromatic black rice in 2.5 acre of land and receives a yield of 14.25q/acre generating a net income of about Rs. 63,680/acre.

With the success and the income generated he proudly says that his biggest achievement is his ability to afford his children's education in private schools as well as pay the medical bills of his father. He recalls that he had a negative perception and a cognitive dissonance regarding the scheme. Had he not been clarified about the scheme through the extension functionaries of MOVCDS, he would not have enjoyed the success that he is enjoying today.

4.10.4. Case study- 4

General information

i. Name of the respondent : Maibam Iren Meitei

ii. Age : 63 years old

iii. Education : Higher secondary

iv. Name of the village : Lourembam

v. Cluster name : Lourembam ‘A’ Cluster

vi. District : Thoubal

Mr. Maibam Iren Meitei with a land holding of 5 acre had organic farming experience prior to joining the scheme. He cultivated vegetables organically in a smaller plot of land mostly meant for his own family’s consumption. Despite having a prior experience in organic farming, he was not aware about the marketing aspect of organic produces.

He got the information about MOVCDS after attending organic agriculture campaigns conducted by MOMA under MOVCDS. From the campaign he got the idea about the market demands of organic produces and became familiar with the concept of integration of the farmers to value chain. Because of his prior experience in organic farming, he was appointed as the Farmer Interest Group (FIG) leader of Lourembam ‘A’ cluster.

After joining the scheme, Mr. Iren now cultivates aromatic black rice in an area of 3 acre which gives him a yield of 13q/acre generating a net income of Rs. 54,000/acre. Being the appointed leader of the farmer interest group, he ensures that his FIG members receive the incentives on time and keep in contact with the service providers to ensure timely supply of agricultural inputs and collection of the produce of the clusters. He also conducts discussion meetings from time to time to enquire about the needs of his FIG members and encourages resource sharing amongst the members.

He commented that keeping the monetary achievements aside, the biggest achievement for him is the sense of leadership that he received under the scheme. He is elated with the fact that despite being 63 years old he is able to give guidance and lead his fellow members into achieving similar success.

4.11. Problems faced by aromatic black rice growers in Mission Organic Value Chain Development Scheme

The production and marketing problems faced by the aromatic rice growers in MOVCDA are presented in Table 24. In respect of production problems, scarcity of organic manure and inadequate financial assistance provided for off-farm inputs (biofertilizers, biopesticides and neem cake) were accorded first and second ranks by the aromatic black rice growers, respectively. While, lack of credit facilities to invest on organic agriculture and allied activities, untimely disbursement of direct fund transfer after verification of on-farm input production units created by beneficiaries, scarcity of labour, erratic onset of monsoon rain, inadequate financial assistance provided for establishing on-farm input production units (liquid manure tanks, compost tanks, botanical extracts etc.), lack of knowledge on pests and disease control, and no reliable package of practices for organic farming were accorded III, IV, V, VI, VIII, VIII and IX ranks, respectively by the aromatic black rice growers.

With respect to the marketing problems, inaccessible to organic produce outlets was assigned first rank by the aromatic black rice growers, followed by lack of access to reliable market information, regulation and distribution channels (II rank), inadequate institutional support for marketing the produce (III rank) and irregular collection of organic produces from farmgate (IV rank) were the other marketing problems faced by aromatic black rice growers in the order of importance.

The authorities of MOVCDS should address the production and marketing problems faced by aromatic black rice growers for the effective implementation of MOVCDS.

Table 24: Problems faced by aromatic black rice growers in Mission Organic Value Chain Development Scheme (n=180)

Sl. No.	Problems*	Aromatic black rice growers		
		No.	%	Rank
A.	Production problems			
1	Scarcity of organic manure	56	31.11	I
2	Inadequate financial assistance provided for off-farm inputs (biofertilizers, biopesticides and neem cake.	43	23.89	II
3	Lack of credit facilities to invest on organic agriculture and allied activities	42	23.33	III
4	Untimely disbursement of direct fund transfer after verification of on-farm input production units created by beneficiaries	37	20.56	IV
5	Scarcity of labour	34	18.88	V
6	Erratic onset of monsoon rain	36	20.00	VI
7	Inadequate financial assistance provided for establishing on-farm input production units (liquid manure tanks, compost tanks, botanical extracts etc.)	25	13.89	VII
8	Lack of knowledge on pests and disease control	23	12.78	VIII
9	No reliable package of practices for organic farming	13	7.22	IX
B.	Marketing problems			
1	Inaccessible to organic produce outlets	52	28.89	I
2	Lack of access to reliable market information, regulation and distribution channels	48	26.67	II
3	Inadequate institutional support for marketing the produce	44	24.44	III
4	Irregular collection of organic produces from farmgate	37	20.56	IV

*Multiple response

4.12. Suggestions of aromatic black rice growers for the effective implementation of Mission Organic Value Chain Development Scheme

Accessibility to organic produce outlets (Rank I), access to reliable market information, regulation and distribution channels (Rank II), adequate institutional support needed for marketing the produce (Rank III), and regular and timely collection of organic produces from farmgate (Rank IV) were the suggestions which were assigned the first four ranks by the aromatic black rice growers for the effective implementation of MOVCDS (Table 25). While the suggestions namely, provision of adequate financial assistance provided for off-farm inputs (biofertilizers, biopesticides and neem cake (Rank V), provision of credit facilities to invest on organic agriculture and allied activities (Rank VI), timely disbursement of direct fund transfer after verification of on-farm input production units created by beneficiaries (Rank VII), inadequate financial assistance provided for establishing on-farm input production units (liquid manure tanks, compost tanks, botanical extracts etc.) (Rank VIII) and accessibility of extension workers for obtaining technical know-how on control of pests and disease control (Rank IX) were the suggestions which were assigned the last five ranks by the aromatic black rice growers for the effective implementation of MOVCDS.The suggestions put forth by the aromatic black rice growers needs to be considered by the policy makers and authorities of MOVCDS for the effective implementation of MOVCDS.

Table 25: Suggestions of aromatic black rice growers for effective implementation of MOVCDS (n=180)

Sl. No.	Suggestions*	Aromatic black rice growers		
		No.	%	Rank
1	Accessibility to organic produce outlets	52	28.89	I
2	Access to reliable market information, regulation and distribution channels	48	26.67	II
3	Adequate institutional support needed for marketing the produce	44	24.44	III
4	Regular and timely collection of organic produces from farmgate	37	20.56	IV
5	Provision of adequate financial assistance provided for off-farm inputs (biofertilizers, biopesticides and neem cake.	43	23.89	V
6	Provision of credit facilities to invest on organic agriculture and allied activities	42	23.33	VI
7	Timely disbursement of direct fund transfer after verification of on-farm input production units created by beneficiaries	37	20.56	VII
8	Inadequate financial assistance provided for establishing on-farm input production units (liquid manure tanks, compost tanks, botanical extracts etc.)	25	13.89	VIII
9	Accessibility of extension workers for obtaining technical know-how on control of pests and disease control	23	12.78	IX

*Multiple response

V SUMMARY

The Mission Organic Value Chain Development for North Eastern Region (MOVCD-NER) is a Centrally Sponsored Scheme established by the Ministry of Agriculture and Farmers Welfare. This is a sub-mission scheme under the National Mission for Sustainable Agriculture (NMSA). Implemented for promoting organic cultivation practices among farmers and values chain creation in the North Eastern States. Phase I was planned to be implemented from 2015-16 to 2017-18, however the project implementation got delayed by two years and it was started from 2017-18 to 2019-2020 covering 2000 ha. The project authorities are planning to implement phase II of the project from 2021-22 covering 50,000 ha. The Mission Organic Value Chain Development Scheme (MOVCDS) is implemented by Manipur Organic Mission Agency (MOMA) in Manipur aiming at promotion and production of certified organic commodities focusing on export-oriented crops viz., Black aromatic rice, Ginger, Tamenglong Orange, King Chilli, Kachai Lemon and Pineapple. The MOMA is conducting various production and extension activities, such as providing training on organic cultivation and identification of farmer cluster groups through which the organic practices, the information and technical know-how is expected to be trickled down.

The black aromatic black rice is a native to the north-eastern region of India. It is gaining importance during the recent years in the local, national and international markets by all the categories of farmers. Black aromatic black rice is considered as one of the healthiest rice varieties with higher vitamins and minerals content, than the white and brown rice. The crop has received the status of Geographical Indicator of Manipur. The black aromatic black rice has a huge market demand and the rice could be used to prepare a good number of value-added products. Even though the crop yield when grown organically yield lower i.e. about 12-15 q/acre the trivial feature of the crop aligns with the major drivers of organic market bloom which include rising disposable incomes, increasing population, rising health consciousness, and consumer spending on health and wellness products making it a popular crop in local, national and even international market.

Though despite the efforts made by MOVCDS in promoting organic cultivation of aromatic black rice, what is needed to be looked upon is the fact that aromatic black rice in spite of its superior nutritional benefits, the crop has not been commercialized to the extent which it needs to be. Owing to the reason that farmers perceived cultivating white rice to be more economically rewarding. Traditionally in Manipur, aromatic black rice is often cultivated and grown in smaller areas or plots. Moreover, organic cultivation has often been criticized on the grounds of lower productivity as compared to the conventional cultivation methods. The present research study was planned to know the effectiveness of the scheme in persuading farmers in cultivating a seemingly minor crop on a larger scale coupled with an organic approach.

With this background, the present research investigation was taken up with the following specific objectives.

1. To develop and standardize a scale to analyze the perception of aromatic black rice growers towards MOVCDS
2. To study the perception of aromatic black rice growers towards MOVCDS
3. To assess the knowledge level of aromatic black rice growers regarding the benefits provided under MOVCDS
4. To study the extent of adoption of organic farming practices by the aromatic black rice growers
5. To find out the association, extent of contribution and direct, indirect, and largest direct effects of profile characteristics of aromatic black rice growers on the perception, knowledge and adoption level.
6. To document the case studies of successful aromatic black rice growers
7. To document the problems faced by the aromatic black rice growers in MOVCDS

The present research study was conducted in Thoubal and Bishnupur districts of Manipur, where the first phase of Mission Organic Value Chain Development Scheme was implemented from 2017-2018 to 2019-20 (phase 1). Thoubal (500 beneficiaries) and

Bishnupur (493 beneficiaries) districts had a larger number of aromatic black rice growers availing the benefits under MOVCDS during the phase 1, hence these two districts in Manipur were purposively selected from among the four districts that were covered under MOVCDS.

The first phase of MOVCDS was implemented in all the taluks of Thoubal and Bishnupur districts, hence all the three taluks (Lilong, Thoubal, and Kakching) from Thoubal districts and all the three taluks (Nambol, Bishnupur, and Moirang) of Bishnupur district were selected for the research study. Three villages from each of the sampled six taluks were randomly selected for the study. From each of the selected 18 villages, ten beneficiary aromatic black rice growers (who were practicing the transplanting method of rice cultivation) were randomly selected for the study. Thus, the total number of beneficiary aromatic black rice growers sampled for the research study was 180. More than 90 per cent of the beneficiary aromatic black rice growers of MOVCDS were practicing transplanting method of rice cultivation. Hence, the beneficiary aromatic black rice growers practicing transplanting method of rice cultivation were purposively selected for the study.

Perception of aromatic black rice growers towards MOVCDS, knowledge of aromatic black rice growers regarding the benefits provided under the MOVCDS and adoption of organic farming practices by aromatic black rice growers were selected as dependent variables for the study. A standardized perception scale was developed for the study to analyze the perception of aromatic rice growers towards MOVCDS. The developed scale was found to be highly reliable and valid. Information on 20 profile characteristics (independent variables) of aromatic black rice growers were collected using a standardized scale and procedure. Data were collected using a pre-tested interview schedule. The collected data were scored, quantified and analyzed using mean, frequency, percentage, standard deviation, student ‘t’ test, chi-square test, multiple regression analysis and path analysis.

The major findings of the research study are as follows:

1. A larger proportion of the aromatic rice growers were of middle age (64.44%), marginal farmers (48.89%), having small family (46.67%), could able to read and write (17.22%) with low level of annual income (40.00%).

2. Majority of the aromatic black rice growers had kept their land fallow for long period (58.34%) and were having moderate organic farming experience (74.45%).

3. More number of aromatic rice growers were belonging to medium/moderate level of livestock possession (42.22%), material possession (46.67%), economic motivation (44.44%), risk orientation (48.89%), mass media exposure (42,22%) of training on organic farming (44.44%).

4. As high as 40.00 per cent of the aromatic black rice growers had obtained high level of crop productivity, while an equal number of aromatic black rice growers (35.56% each) were having low and high level of management orientation.

5. A larger number of aromatic black rice growers were belonging to high level of achievement motivation (42.22%), aspiration (44.43%), innovative proneness (42.22%), extension agency contact (40.00%) and extension participation (42.78%).

6. Majority of the aromatic black rice growers had ‘strongly agreed’ for almost all the positive perception statements and ‘strongly disagreed’ for all the negative perception statements in respect of production, supporting and processing and marketing components of MOVCDS.

7. A greater number of the aromatic black rice growers (40.55%) had better overall perception, whereas more than one-third (37.22%) and less than one-fifth (18.33%) of them had good and poor perception towards MOVCDS.

8. A vast majority of over 85.00 per cent of the aromatic black rice growers had correct knowledge regarding the benefits provided under MOVCDS.

9. Almost half of the aromatic black rice growers (47.77%) had high level of knowledge regarding the benefits provided under MOVCDS, whereas 32.79 and 19.44 per cent of the aromatic black rice growers had medium and low level of knowledge regarding the benefits provided under MOVCDS, respectively.

10. Majority of the aromatic black rice growers had completely adopted technologies/practices such as, variety, seed rate, nursery and transplanting management practices, planting seedlings in main field, nutrient management practices, water management practices, weed management practices, cultural and mechanical method of plant protection, and harvesting practices

11. Biological methods of controlling pests and diseases and application of recommended lime, vermicompost and neem cake were partially adopted by the aromatic black rice growers

12. Larger proportion (40.55%) of the aromatic black rice growers belonged to the high adoption category, while 35.00 per cent belonged to the medium adoption category and the remaining 24.45 per cent of the aromatic black rice growers belonged to low adoption category of organic farming practices.

13. An increase of 5.21 and 5.24 per cent was observed in respect of grain yield and straw yield, respectively after registering of aromatic black rice growers to MOVCDS. However, there was a significant increase in the gross income (25.07%) and net income (41.47%) of aromatic black rice growers after joining the MOVCDS.

14. The chi square test result revealed a highly significant association between: (a) perception towards MOVCDS and the knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS, (b) perception of aromatic black rice growers towards MOVCDS and adoption of organic farming practices, and (c) knowledge of aromatic black rice growers regarding the benefits provided under MOVCDS and adoption of organic farming practices.

15. Education, organic farming experience, livestock possession, crop productivity, achievement motivation, aspiration, management orientation, economic motivation, risk orientation, innovative proneness, mass media exposure, training on organic farming, extension agency contact and extension participation of aromatic black rice growers were having significant to highly significant association with their perception towards MOVCS, knowledge regarding benefits provided under MOVCDS and adoption of organic farming practices.

16. All the 20 profile characteristics (independent variables) of aromatic black rice growers together have contributed to the tune of 71.69, 70.68 and 73.88 per cent in developing better perception towards MOVCDS, increasing knowledge regarding the benefits provided under MOVCDS and adoption of organic farming practices, respectively.

17. Extension agency contact, extension participation and training on organic farming were found to be having the direct effect, indirect effect and largest indirect effect in developing better perception towards MOVCDS and increasing the knowledge regarding the benefits provided under MOVCDS and adoption of organic farming practices by the aromatic black rice growers.

18. Case studies were carried out on four beneficiary farmers. Four farmers were interviewed have followed the recommended aromatic black rice growers as advocated by MOVCDS. There was an increase in the grain yield (13- 14.60 q/acre) and net income (Rs. 54,000 to Rs.63,680/acre) of the case studies carried out on four aromatic black rice growers. of grain yield. The respondents attributed their success in getting good crop yield and net income due to the incentives provided under MOVCDS, technical know-how disseminated through extension activities by the extension field functionaries and also the buy system of aromatic black rice by MOVCDS.

19. In respect of production problems, the scarcity of organic manure and inadequate financial assistance provided for off-farm inputs (biofertilizers, biopesticides and

neem cake) were accorded first and second ranks by the aromatic black rice growers.

20. With respect to the marketing problems, inaccessible to organic produce outlets was assigned first rank by the aromatic black rice growers, followed by lack of access to reliable market information, regulation and distribution channels (Rank II) was assigned the second rank by the aromatic black rice growers.

21. Accessibility to organic produce outlets (Rank I), access to reliable market information, regulation and distribution channels (Rank II), adequate institutional support needed for marketing the produce (Rank III), and regular and timely collection of organic produces from farmgate (Rank IV) were the suggestions which were assigned the first four ranks by the aromatic black rice growers for the effective implementation of MOVCDS.

Implications of the study

1. Biological method of controlling pests and disease and application of recommended lime, vermicompost and neem cake were partially adopted by almost all the aromatic black rice growers, hence the aromatic black rice growers need to be educated by the extension personnel of MOVCDS on the advantages of practicing the above technology. These practices are ecofriendly, economical and improves the soil fertility.

2. Aromatic black rice growers need to be given due consideration for using organic manure to the rice crop and they should be made aware of the ill effects of imbalanced and indiscriminate use of inorganic fertilizers. Advantages of using organic manure (farm yard manure, compost, biofertilizers, vermicompost, azolla etc.,) and application of micro nutrients needs to be encouraged among aromatic black rice growers.

3. Education and mass media exposure of aromatic black rice growers have greatly influenced in developing better perception towards MOVCDS and increasing

knowledge regarding the benefits provided under MOVCDS and adoption of organic farming practices. Therefore, it is important for the MOVCDS to publish/broadcast/telecast messages on importance of organic farming practices, incentives/facilities provided to beneficiaries under MOVCDS and success stories of farmers practicing organic farming in both print (farm magazines, newspapers, leaflets etc.) and electronic (radio, television, internet etc.) media.

4. Training on organic farming, extension participation and extension agency contact were also having highly significant association with the perception, knowledge and adoption level. Ample opportunities should be provided for the aromatic black rice growers to participate in training programmes and extension activities (discussion meetings, demonstrations, farmer field school, exhibitions, field days etc.) and there should be easy accessibility of extension personnel to the beneficiaries would help the beneficiaries in developing better perception towards MOVCDS and increasing knowledge regarding the benefits provided under MOVCDS and adoption of organic farming practices, leading to increased crop yield and income.

5. Adequate financial assistance needs to be provided for off-farm inputs and on-farm input production units, adequate and timely availability of credit and timely disbursement of direct fund transfer by the authorities of MOVCDS would help the aromatic black rice growers to increase the adoption level of organic farming practices.

6. Accessibility to organic produce outlets, access to reliable market information, regulation and distribution channels, adequate institutional support for marketing the produce and regular and timely collection of organic produces from farmgate by the MOVCD authorities would help the farmers in getting good marketing facilities, besides receiving good price for the organic aromatic black rice produce.

Future line of work

1. The research study was confined to only one crop (Aromatic black rice) amongst many other organic crops promoted by MOVCDS, hence a similar line of research could be conducted in the North Eastern states of India centering around crops such as King Chilli, Ginger, Kachai, Lemon and Turmeric.

2. A study on the socio-economic impact on the beneficiary farmers in North Eastern states of India would throw light on the effectiveness of MOVCDS on the beneficiary farmers.

3. Study could be conducted on the group dynamics of the Farmer Interest Groups (FIGs) formed under MOVCDS, to investigate about the mechanism and effectiveness of resources sharing in Farmers Interest Groups.

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APPENDIX I

UNIVERSITY OF AGRICULTURAL SCIENCES, BENGALURU

Dr. M.T. Lakshminarayan
Associate Professor & Assistant Controller
of Examinations.

University Examination Centre,
GKVK, Bengaluru - 560065

Date – 21/05/2020

Dear Sir/ Madam,

I am glad to inform you that Mr. Meghajit Sharma Shijagurumayum, Ph.D. scholar in the Department of Agricultural Extension, College of Agriculture, UAS, Bangalore, is pursuing a research study on the topic *"A Study on Knowledge and Perception of Aromatic Black Rice Growers towards Mission Organic Value Chain Development Scheme in Manipur"* under my guidance. As part of the study, the student researcher has to develop a scale to analyse the "Perception of aromatic black rice growers towards Mission Organic Value Chain Development Scheme".

The Mission Organic Value Chain Development for North Eastern Region (MOVCD-NER) is a Central Government Scheme implemented by the Ministry of Agriculture and Farmers Welfare, for promoting organic cultivation practices among farmers in the eight North-Eastern states of the country. The scheme was implemented during 12th plan period by Manipur Organic Mission Agency (MOMA) in Manipur aiming at promotion and production of certified organic commodities focussing on export oriented crops viz., Black Aromatic Rice, Ginger, Tamenglong Orange, King Chilli, Kachai Lemon and Pineapple. During phase I of MOVCD, the cultivation of organic practices among aromatic black rice growers is promoted in four valley districts (Thoubal, Bishenpur, Imphal East and Imphal West) of Manipur state.

Perception of aromatic black rice growers towards MOVCDS is operationally defined *'as the degree to which an individual has understood the value chain activities of production, supporting and processing and marketing components of MOVCDS'.* Considering your vast expertise and professional experience, your opinion is solicited to obtain the relevancy of the items to analyse the "Perception of aromatic black rice growers towards MOVCDS". You are requested to kindly go through the perception statements carefully and offer your valued assessment regarding each statement. Please tick (√) against each statement in the appropriate column that coincides with the degree of your judgment viz., Most Relevant (MR), Relevant (R), Some What Relevant (SWR), Less Relevant (LR) and Not Relevant (NR). The statements listed are only suggestive. If, in your opinion, any of the statements are missing, please feel free to add new statements or refine as considered by you. The completed proforma may please be mailed to the student researcher (meghajit59@gmail.com) at the earliest possible time. I am expecting your good will and whole hearted co-operation in this regard.

Thanking you,

Yours faithfully
(M.T. LAKSHMINARAYAN)

Scale to Analyse the Perception of Aromatic black rice growers towards Mission Organic Value Chain Development Scheme

Following are the statements to analyse the perception of aromatic black rice growers towards Mission Organic Value Chain Development Scheme. Please indicate your agreement as Most Relevant (MR), Relevant (R), Somewhat Relevant (SWR), Less Relevant (LR) and Not Relevant (NR) by putting tick mark (✓) in the appropriate column against each statement.

Sl. No.	Statement	MR	R	SWR	LR	NR	Relevancy percentage	Mean Relevancy score	t value
A	**Production component**								
1	MOVCDS aims at development of certified organic production in a value chain mode						90.60	4.53	4.00**
2	The scheme promotes organic farming among black rice growers						60.00	2.40	0.97NS
3	More number of Black rice growers have shifted from chemical to organic farming after the implementation of MOVCDS						87.27	4.36	3.96**
4	MOVCDS is advocating excessive use of inorganic fertilizers to black rice						80.30	4.20	2.29*
5	Crop planning and time management are not effectively followed by Black rice growers by participating in the value chain activities of MOVCDS						85.99	4.29	2.31*

6	MOVCDS improves production system to ensure higher productivity with better profitability for organic black rice growers						70.00	2.80	1.01NS
7	MOVCDS is emphasizing the farmers to use less of organic manure to black rice						84.65	4.23	2.29*
8	Each farmer producer company is allotted a minimum area of 400 ha of organic cultivation						71.00	2.82	1.02NS
9	Black rice growers are indiscriminately using fertilizer after the implementation of MOVCDS						61.82	2.48	.99NS
10	MOVCDS facilitate farmers with untimely supply of quality seeds						80.00	4.00	1.71*
11	Organic farming technologies are disseminated to the black rice growers through MOVCDS						72.00	2.85	1.11NS
B	**Supporting component**								
12	MOVCDS empowers black rice growers with programme ownership by organizing them into Farmers Interest Groups (FIGs) at village level and federated into Farmers Producers Companies (FPCs) at District level						85.99	4.27	2.56**
13	MOVCDS develops rice production clusters with necessary infrastructural, technical and financial support.						80.91	4.05	1.81*

14	Farmers Producers Companies (FPCs) have established strong linkages between organic black rice growers and service delivery institutions						50.00	2.00	.88NS
15	Farmers cluster provides an opportunity for its members to develop leadership qualities						84.55	4.23	2.30**
16	Resource sharing among Black rice growers is possible due to formation of FIGs						70.00	2.80	.89NS
17	Farmers clusters have not provided platform for sharing experience among the members						86.06	4.30	3.19**
18	MOVCDS provides financial assistance to Black rice growers for creation of on-farm input production structures (liquid manure tanks, compost tanks, etc.)						55.00	2.20	.88NS
19	MOVCDS extends subsidy for purchasing off-farm organic inputs (Bio-fertilizers, bio-pesticides, neem cake etc.) to the organic black rice growers						61.00	2.44	.71NS
20	MOVCDS has established agri- machinery custom hiring centres to cater the needs of Black rice growers						72.00	2.88	.92NS
21	Participating in value chain activities of MOVCDS has not helped Black rice growers to have strong research and extension linkages						83.94	4.20	2.29*

22	MOVCDS has provided timely logistic support in terms of aggregation and transportation of organic black rice						70.05	2.81	1.26NS
23	Outreach activities (demonstrations, training, field visits, field days etc.) of MOVCDS has increased the adoption of more organic farming practices						82.73	4.14	2.22*
C	**Processing and marketing component**								
24	Organic Bazaars are established to function as collection centres between the farm gate and processing infrastructures						84.66	4.27	2.32*
25	The scheme has set up an effective integrated pack house as subsidiary component of collection, aggregation and grading units and integrated processing units						48.00	2.39	.78NS
26	MOVCDS facilitates partnerships and trade relations between FPCs and organic businesses for promoting domestic and exports markets						80.30	4.02	1.77*
27	The marketing infrastructure are established within the radius of 25 km from farmers clusters						50.00	2.00	0.69NS
28	MOVCDS has created awareness among public by giving wide publicity through printed literature, films and local advertisements for promoting the sale of organic black rice						85.23	4.26	2.41**

29	MOVCDS has launched the marketing of organic black rice through periodic campaigns in selected cities of the country						69.00	2.76	1.28NS
30	MOVCDS markets the organic produce through direct retail, farmer markets, on-line chain and tying up with domestic retail chains and exporters						81.99	4.09	2.11*
31	MOVCDS has organized trade fairs/organic festivals for effective marketing of organic black rice among trading fraternity and value chain operators.						82.67	4.08	2.28*
32	The scheme has trained black rice growers to inculcate branding principles and handling of their produce						48.50	1.94	.66NS
33	MOVCDS enables Manipur to evolve its own brand for organic black rice						81.52	4.08	2.02*
34	Transparency is lacking in value chain activities of MOVCDS						69.00	2.76	1.38NS

The statements which were having relevancy percentage of 75 per cent and above, mean relevancy score of 3.75 and above and 't' value of 1.67 and above were considered for the final perception statement.

APPENDIX II

UNIVERSITY OF AGRICULTURAL SCIENCES
DEPARTMENT OF AGRICULTURAL EXTENSION
GKVK, BANGALORE-65

Interview schedule for data collection

"A Study on Knowledge and Perception of Aromatic Black Rice Growers towards Mission Organic Value Chain Development Scheme in Manipur"

Date of Interview: Respondent No:

Part A

I. General information

i. Name of the respondent :
ii. Father name :
iii. Name of the village
iv. Name of Cluster :
v. Taluk :
vi. District :
vii. Contact no. :

II. Information on profile characteristics of aromatic black rice growers

1. **Age** (years) …….
2. **Education**

Illiterate / Can read and write/ Primary education / Middle school education/ Matriculation/ ITI / Higher secondary education /Diploma/ Graduation / Post-graduate

3. **Family size (members per family)**
    a. Small family (up to 5)
    b. Medium family (6-8 members)
    c. Large family (> 8 members)

4. **Land holdings (area in acre)**

Type of land	Acre
1. Irrigated	
2. Garden	
3. Dry	
Grand total	

5. **Annual income**

Sl. No.	Source	Income (Rs. / annum)
1	Aromatic black rice	
2	Agriculture	
3	Horticulture	
4	Wage labour	
5	Subsidiary occupation (animal husbandry etc,) a. b. c.	
	Others (specify)	
	Total	

6. Fallow period: ……. (Months)

7. Organic farming experience: ……(Years)

8. Livestock possession

Please provide details of the livestock possessed –

Sl. No.	Particulars	Livestock possession		
		Local	**Improved**	**Total**
1.	Bullocks			
2.	Cows			
3.	Buffalo			
4.	Poultry (a) Broiler (b) Layers (c) Duck			
5.	Pig			
6.	Goat			
7	Sheep			
8	Others (Specify)			

9. Material possession

a) Electronic & home appliances

Radio	**T.V.**	**Two wheeler**	**Four wheeler**	**Mixer**	**Mobile phone**	**Refrigerator**	**L.P.G.**

b) Agricultural implements / Equipment

MB plough	**Wooden plough**	**Cultivator**	**Tractor**	**Pump set**	**Oil engine**	**Sprayers**	**Harrow**

10. Crop productivity

Sl. No.	Particulars	I crop	II crop	III crop
A	Before MOVCDS			
	i) Grain yield (q/acre)			
	ii) Straw Yield (q/acre)			
	iii) Grain (Rs/q)			
	iv) Straw (Rs/q)			
B	After MOVCDS			
	i) Grain yield (q/acre)			
	ii) Straw Yield (q/acre)			
	iii) Grain (Rs/q)			
	iv) Straw (Rs/q)			

11. Achievement motivation

Please give the information about the following statements

Sl. No.	Statements	Agree	Undecided	Disagree
1.	Work should come first even if one cannot get proper rest in order to achieve one's goals			
2.	One should enjoy work as much as play			
3.	One should have determination and driving ambition to achieve certain things in life even if these qualities make one unpopular			
4.	Even when one's interests are in danger he should concentrate on his job and forget his obligations to others			
5.	One should succeed in occupation even if one has to neglect his family			
6.	One should set difficult goals for oneself and try to reach them			

12. Aspiration

a) Where on the ladder do you feel personally stand at?

Step no - _____

b) Where on the ladder do you feel personally stood five years back?

Step no - _____

c) Where do you think you will be five years from now?

Step no - _____

10	
9	
8	
7	
6	
5	
4	
3	
2	
1	

13. Management orientation

Please indicate your agreement for the following with Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (DA), and Strongly Disagree (SDA)

Sl. No.	Statements	Response category				
		SA	A	UD	DA	SDA
A.	**Planning orientation**					
1	One should think of diversification of crops and not to depend on only one crop					
2	It is not necessary to make prior decision about the variety of crops to be cultivated in the land					
3	The number of buildings, quantity of manures and organic fertilizers, organic plant protection chemical, etc., needed for raising crops should be assessed before taking up cultivation					
4	It is necessary to think ahead about the cost involved in raising the crop					
5	One need not consult an agricultural expert for the crop planning					

B.	**Production orientation**					
1	Timely and judicious irrigation of a crop ensures good yield					
2	One should use as much organic manures as he wishes					
3	Determining organic input dose by soil testing saves money					
4	Variety of the crop should be grown as recommended by the specialists					
5	Timely management of weeds will ensure good yield					
C.	**Marketing orientation**					
1	Market news is not important for farmers to know when to send his produce to the market					
2	One should know different forms of produce and its prices in the market					
3	One should purchase his inputs from the shop where his relative purchases					

14. Economic motivation

Sl. No.	**Statements**	**Response**	
		Agree	**Disagree**
1	A farmer should work towards larger yield and economic benefits		
2	The most successful farmer is the one who makes the most profit		
3	A farmer should try any new farming ideas that may earn him/her more money		
4	A farmer should grow crop with higher market values to increase monetary profits in comparison to growing of food crops for own consumption		
5	A farmer should value add their produce to obtain more monetary gain		
6	It is not difficult for the farmer's children to make good start unless he/she is provided with economic assistance		

15. Risk orientation

Sl. No.	Statements	SA	A	UD	D	SD
1	A farmer should grow large number of crops to avoid greater risks in growing one or two crops					
2	A farmer should take more chance in making a big profits than to be context with smaller but less risky profits					
3	A farmer who is willing to take risk than the average farmer usually does it better financially					
4	It is good for a farmer to take risk, which he/she knows his/her chances of success is fairly high					
5	It is better for a farmer not to try new farming methods unless most of other farmers have used those methods successfully					
6	Trying an entirely new methods for a farmer involves risk but it is worth					

16. Innovative proneness

Please indicate your agreement or disagreement for the following with Strongly Agree(SA), Agree (A), Undecided (UD), Disagree (DA), and Strongly Disagree (SDA).

Sl. No.	Statements	Response category				
		SA	A	UD	D	SD
1	I am very much interested in adopting whatever new practices that are helpful in better farming					
2	Since, we are not sure of the new practices, I would like to wait till others adopt					
3	Since new practices are not profitable, I am not interested in any of them.					
4	I try to keep myself well informed about the improved practices and try to adopt as soon as possible.					
5	New practices are not easily adoptable and hence I do not adopt.					

17. Mass media exposure

How often do you expose to different mass media?

Sl. No.	Source	Extent of exposure		
		Regularly	Occasionally	Never
1	Reading Newspaper			
2	Listening to radio			
3	Reading farm magazine			
4	Watching Door darshan Kendra Imphal			

18. Training on organic farming

Sl. No.	Name of the training received	Duration

19. Extension agency contact

How often you contact extension personnel in your area?

Sl. No.	Extension personnel	Frequency of contact			
		Often	Sometimes	Rarely	Never
1	Agricultural Development officer				
2	Assistant Agricultural officer				
3	Agricultural technological manager /Block technological manager				
4	Technical staff of Manipur Organic Mission Agency				
5	Non-governmental organization				
6	Others (specify)				

20. Extension participation

How often you participated in the following extension activities?

Sl. No.	Activities	Response category		
		Regularly	Occasionally	Never
1	Group meetings/discussion			
2	Seminars/talks			
3	Demonstrations			
4	Krishimela/exhibitions			
5	Field day / visits			
6	Training			
7	Others (specify)			

Part – B

Knowledge of aromatic black rice growers regarding the benefits provided under Mission Organic Value Chain Development Scheme

Sl. No.	Knowledge statements	Aromatic black rice growers	
		Correct knowledge	Incorrect knowledge
1	An assistance of Rs. 3750 per ha could be availed for the establishment of on-farm input production unit.		
2	One-time assistance of Rs. 3750 per ha area could be procured by the farmers in the first year for procurement of off-farm inputs such as biofertilizers, biopesticides and neem cake		
3	Farmers are provided with the quality seed/ planting material as assistance for the first two years of establishment		
4	Assistance for quality seed/ planting material through the MOVCDS is limited to 50% of actual seed/ planting material cost (limited to Rs17500/ha)		
5	Resource sharing is facilitated among registered Black rice growers in Farmers Interest Groups		
6	Collection of produce is endured by service providers for the sale of the produce		
7	Timely logistic support in terms of aggregation and transportation of organic black rice is provided under MOVCDS		
8	Agri-machinery custom hiring centers are established to cater the needs of Black rice growers		
9	Storages chambers for storing crop harvest have been established at each district		
10	Effective integrated pack house is established as subsidiary component of collection, aggregation and grading units and integrated processing units		
11	A three-year organic scope certification is being carried out under MOVCD to help certify the produces		
12	The marketing infrastructure are established within the radius of 25 km from farmers clusters to increase access to market		
13	The scheme enables the beneficiaries to sale their produces under the brand name “Organic Manipur”		

Part – C

Perception of the aromatic black rice growers towards Mission Organic Value Chain Development Scheme

(Please indicate response for the following statements)

(SA=Strongly disagree; A=Agree; UD=Undecided; D=Disagree; SD=Strongly disagree)

Sl. No.	Perception statement	SA	A	UD	D	SD
A.	**Production component**					
1	MOVCDS aims at development of certified organic production in a value chain mode (+)					
2	More number of Black rice growers have shifted from organic to chemical farming after the implementation of MOVCDS (+)					
3	Crop planning and time management are not followed effectively followed by Black rice growers by participating in the value chain activities of MOVCDS (-)					
4	MOVCDS facilitate farmers with untimely supply of quality seeds (-)					
5	MOVCDS is emphasizing the farmers to use less of organic manure to black rice (-)					
6	MOVCDS is advocating excessive use of inorganic fertilizers to black rice (-)					
B.	**Supporting component**					
7	MOVCDS empowers black rice growers with programme ownership by organizing them into Farmers Interest Groups (FIGs) at village level and federated into Farmers Producers Companies (FPCs) at District level (+)					
8	Farmers cluster provides an opportunity for its members to develop leadership qualities (+)					
9	Farmers clusters has not provided platform for sharing experience among the members (-)					
10	MOVCDS develops rice production clusters with necessary infrastructural, technical and financial support (+)					
11	Participating in value chain activities of MOVCDS has not helped the Black rice growers to have strong research and extension linkages (-)					
12	Outreach activities (demonstrations, training, field visits, field days etc.) of MOVCDS has increased the adoption of more organic farming practices (+)					
C.	**Processing and Marketing component**					
13	Organic bazaars are established to function as collection centers between the farm gate and processing infrastructures (+)					
14	MOVCDS facilitates partnerships and trade relations between FPCs and organic businesses for promoting domestic and exports markets (+)					
15	MOVCDS has created awareness among public by giving wide publicity through printed literature, films and local advertisements for promoting the sale of organic black rice (+)					
16	MOVCDS markets the organic produce through direct retail, farmer markets, on-line chain and tying up with domestic retail chains and exporters (+)					
17	MOVCDS has organized Trade fairs/organic festivals for effective marketing of organic black rice among trading fraternity and value chain operators (+)					
18	MOVCDS enables Manipur to evolve its own brand for organic black rice (+)					

Part – D

Extent of adoption of organic farming practices followed by the aromatic black rice growers

Sl. No.	Organic farming practices	Adoption level		
		Full adoption	Partial adoption	Non adoption
1.0	**Variety**			
1.1	Chakhao Poreiton			
1.2	Chakhao Amubi			
2.0	**Seed rate**			
2.1	Seed rate (40-50 kg/ha)			
3.0	**Nursery preparation**			
3.1	Seed treatment in saltwater of proportion 1:4 (salt to water by volume) for selecting heavy seeds			
3.2	Application and mixing of farmyard manure (300 kgs/750 m^2)			
3.3	Sowing pre-germinated seeds and broadcasting on a drained bed at the rate of 50-60 g seeds/sq meter (or 10 sq. ft)			
3.4	Keeping the seedbed moist, for the first 4-5 days and avoiding flooding of bed			
4.0	**Preparation of main field**			
4.1.	Preparing of land (3-4 ploughings)			
4.2	Secondary tillage followed by puddling and levelling			
4.3	Application of lime at the rate of 500-700kg /ha at the first and second ploughing			
5.0	**Planting seedlings in main field**			
5.1	Seedlings of 20-25 days old needs to transplanted in main field			
5.2	Transplanting seedlings in 20cm rows 10 cm apart with 2- seedling/hill			
5.3	Transplanting seedlings at a depth of at least 5 cm			
6.0	**Nutrient management practices**			
6.1	Incorporating farm yard manure or compost (2 t/ha)			
6.2	Incorporating weed biomass/ crop residue (5 t/ha)			
6.3	Application of neem cake (250-300 kgs/ha) during land preparation			

Sl. No.	Organic farming practices	Adoption level		
		Full adoption	Partial adoption	Non adoption
6.4	Use of rock phosphate (250 kg/ha) during land preparation			
6.5	Use of bio-fertilizers like azospirillum (1 kg/ha) mixed with 40-50 kg FYM			
6.6	Use of azolla as green manure/biofertilizer			
6.7	Use of liquid manure Humicil (L) (500 ml/ha) for one time application			
6.8	Use of vermicompost (5t/ha)			
6.9	Use of commercial organic formulations such as Vitaphos etc.			
7.0	**Water management**			
7.1	Limiting the level of water in the plots to 2.5cms during the first 10 days			
7.2	Maintaining a continuous sub-mergence of 2-5cm during crop growing period until 10 days before harvesting			
7.3	Limiting the level of water to 5cm during the time of tillering			
7.4	Periodical draining and drying of the land for aeration			
8.0	**Weed management practices**			
8.1.0	**Cultural method**			
8.1.1	Annual weeds controlled by frequent shallow ploughing before transplanting			
8.1.2	Deep-rooted perennial weeds controlled by deep ploughing in summer months			
8.1.3	Crop rotation followed to reduce weed population			
8.1.4	Regular incorporation of weeds into soil during fallow period			
8.1.6	Flooding up to 10-20 cm early in the season for reducing weed infestation			
8.1.7	Dual cropping of rice and azolla helps suppress weed			
8.1.8	Releasing about 20 ducklings for minimizing weed and pests			
8.2.0	**Mechanical method**			
8.2.1	Hand weeding and stirring the soil followed for good aeration			
8.2.2	Rotary weeder used to control interspace weed			

Sl. No.	Organic farming practices	Adoption level		
		Full adoption	Partial adoption	Non adoption
9.0	**Plant protection measures**			
9.1.0	**Cultural practices before sowing**			
9.1.1	Deep summer ploughing			
9.1.3	Timely destruction of crop residue			
9.1.4	Seed / seedling treatment			
9.2	**Cultural practices after sowing**			
9.2.1	Application of more organic manure			
9.2.2	Proper water management practices			
9.2.3	Weed control at right time			
9.3	**Mechanical method**			
9.3.1	Collection and destruction of eggs, larvae and pupae of crop pests			
9.3.2	Installed light traps/pheromone traps to attract adult pests			
9.3.3	Destruction of affected plant parts			
9.3.4	Use of rope dipped in kerosene for minimizing the pest attack			
9.4	**Biological method**			
9.4.1	Spraying of neem oil @ 2-3ml/lt of water (500 litres/ha)			
9.4.2	Spraying of 2% solution of turmeric powder for managing rice blast (500 litres/ha)			
9.4.3	Spraying of *Verticilium lecanii* @ $1x10^9$ spores/ml to control white backed plant hoppers			
9.4.4	Releasing *Tricogramma* egg parasitoid @50000/ha for controlling leaf folder and stem borer			
9.4.5	Spraying of *Beauveria bassiana* @ 3 g/lt for control of rice hispa (500 litres/ha)			
9.4.6	Other commercial organic pesticides such as Calraid, Tricocare etc.			
10.0	**Harvesting practice**			
10.1	Harvesting the crop when more than 90% of panicles have turned to a hard dough stage			

PART-E

Problems faced by aromatic black rice growers in MOVCDS

Sl. No.	Problems	Aromatic black rice growers	
		No	Yes
1.	**Production problems**		
1	Scarcity of organic manure		
2	Inadequate financial assistance provided for off-farm inputs (biofertilizers, biopesticides and neem cake.		
3	Lack of credit facilities to invest on organic agriculture and allied activities		
4	Untimely disbursement of direct fund transfer after verification of on-farm input production units created by beneficiaries		
5	Scarcity of labour		
6	Erratic onset of monsoon rain		
7	Inadequate financial assistance provided for establishing on-farm input production units (liquid manure tanks, compost tanks, botanical extracts etc.)		
8	Lack of knowledge on pests and disease control		
9	No reliable package of practices for organic farming		
2	**Marketing problems**		
1	Inaccessible to organic produce outlets		
2	Lack of access to reliable market information, regulation and distribution channels		
3	Inadequate institutional support for marketing the produce		
4	Irregular collection of organic produces from farmgate		

Suggestions of aromatic black rice growers for effective implementation of MOVCDS

Sl. No.	Suggestions	Aromatic black rice growers	
		No	Yes
1.	Accessibility to organic produce outlets		
2.	Access to reliable market information, regulation and distribution channels		
3.	Adequate institutional support needed for marketing the produce		
4.	Regular and timely collection of organic produces from farmgate		
5.	Provision of adequate financial assistance provided for off-farm inputs (biofertilizers, biopesticides and neem cake.		
6.	Provision of credit facilities to invest on organic agriculture and allied activities		
7.	Timely disbursement of direct fund transfer after verification of on-farm input production units created by beneficiaries		
8.	Inadequate financial assistance provided for establishing on-farm input production units (liquid manure tanks, compost tanks, botanical extracts etc.)		
9.	Accessibility of extension workers for obtaining technical know-how on control of pests and disease control		

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Perception of Aromatic Black Rice Growers Towards Mission Organic Value Chain Development Scheme

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Abstract

The research study was conducted in Thoubal and Bishnupur districts of Manipur state during 2020-21 to analyze the perception of aromatic black rice growers towards Mission Organic Value Chain Development Scheme (MOVCDS) and to find out the association between the profile characteristics of aromatic black rice growers with their perception toward MOVCDS. One hundred and eighty aromatic rice growers were interviewed using a pre-tested interview schedule. The results revealed that a vast majority (81.67%) of aromatic black rice growers had good to better level of perception towards MOVCDS. Education, organic farming experience, livestock possession, crop productivity, achievement motivation, aspiration, management orientation, economic motivation, risk orientation, innovative proneness, mass media exposure, training on organic farming, extension agency contact, and extension participation of aromatic black rice growers had significant to highly significant association with their perception towards MOVCDS. All the 20 profile characteristics of aromatic black rice growers had contributed to the tune of 71.69 per cent in developing a better perception towards MOVCDS

Keywords- Perception, Aromatic black rice growers, MOVCDS, Extension participation

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Introduction

The North-Eastern region of India provides considerable scope and opportunity for organic farming due to less utilization of chemical inputs, availability of conducive agro-ecological for organic farming, soil rich in organic matter (>1%), high farm-level agricultural diversity, and above all the North-Eastern region are traditionally following

low external input-driven agriculture. It is estimated that nearly 18 million ha of such land is available in the North-East, which can be exploited for organic production. Various research findings have revealed that the provision of subsidies is positively associated with farmer's decision to shift from modern to organic farming. One such scheme which promotes organic agriculture coupled with the provision of subsidies in the north-eastern region is the Mission Organic Value Chain Development Scheme in North East Region (MOVCD-NER). This scheme is a Centrally Sponsored Scheme established by the Ministry of Agriculture and Farmers Welfare, and it is a sub-mission scheme under the National Mission for Sustainable Agriculture.

The Mission Organic Value Chain Development Scheme (MOVCDS) is implemented by Manipur Organic Mission Agency (MOMA) in Manipur aiming at the promotion and production of certified organic commodities focussing on export-oriented crops *viz.*, Black aromatic rice, Ginger, Tamenglong orange, King chilli, Kachai lemon, and Pineapple. Phase I of the project was planned to be implemented from 2015-16 to 2017-18, however, the project implementation got delayed by two years and it was started from 2017-18 to 2019-2020 covering 2000 ha. The project authorities are planning to implement phase II of the project from 2021-22 covering 50,000 ha. The MOMA is conducting various production and extension activities, such as providing training on organic cultivation and identification of farmer cluster groups through which the organic practices, the information, and technical know-how is expected to be tickled down.

Black aromatic rice is gaining importance in the national and international markets from all the categories of farmers. It is considered to be the healthiest rice variety with higher vitamins and minerals content, than white and brown rice. Its black colour is due to the presence of powerful natural black colouring pigment (Anthocyanins), which is an impressive antioxidant property having many health benefits. The crop has received the status of '*Geographical Indicator of Manipur'* and it has a huge market demand because the rice could be used to prepare a good number of value-added products. Even though that the crop yield when grown organically yields lower i.e., about 12-15 q/acre, the trivial feature of the crop aligns with the major drivers of organic market bloom, which include rising disposable incomes, increasing population, rising health consciousness, and consumer spending on health and wellness products making it a popular crop in local,

national and even at international markets. There are no research studies for analysing the perception of farmers towards MOVCDS, hence the present study was undertaken with the following specific objectives:

1. To analyze the perception of aromatic black rice growers towards Mission Organic Value Chain Development Scheme
2. To find out the association and extent of contribution of profile characteristics of aromatic black rice growers on the perception towards MOVCDS

Methodology

Mission Organic Value Chain Development Scheme was implemented in the dominant aromatic black rice-growing areas of Bishnupur, Imphal East, Imphal West, and Thoubal districts of Manipur during the first phase of the project (2017-2018 to 2019-2020). The present research study was conducted in Bishnupur (500 beneficiaries) and Thoubal (493 beneficiaries) districts, since Thoubal (500 beneficiaries) and Bishnupur (493 beneficiaries) districts had more number of aromatic black rice growers, who had availed benefits under MOVCDS during phase I (Table A). The same beneficiaries have derived benefits under MOVCDS for all the three years of phase I of the MOVCDS.

Table A: Area and number of beneficiaries under MOVCDS in Manipur

Sl. No.	District	Area (ha)	No. of beneficiaries
1	Thoubal	500	500
2	Bishnupur	500	493
3	Imphal West	500	410
4	Imphal East	500	427

All the three taluks of Bishnupur and Thoubal taluks were selected for the research study. Three villages from each of the sampled six taluks were randomly selected for the study. From each of the selected 18 villages, ten beneficiary aromatic black rice growers

were randomly selected for the study. Thus, the total number of beneficiary aromatic black rice growers sampled for the research study was 180.

Perception of the aromatic black rice growers towards MOVCDS was operationally defined in the present research study as *'the degree to which an individual has understood the production, supporting, and processing and marketing components of value chain activities of MOVCDS'.* A standardized scale was developed specifically for the research study to analyze the perception of aromatic black rice growers towards MOVCDS. The developed perception scale was found to be highly reliable (0.771) and valid (0.8430). The developed perception scale consists of 18 statements for determining the perception of beneficiary aromatic black rice growers categorized under production, supporting, and processing, and marketing components (Table 1). The response was collected on a five-point continuum, namely, strongly agree, agree, undecided, disagree, and strongly disagree with an assigned score of 5,4,3,2, and 1 for positive statements, and reverse scoring for negative statements respectively. Thus, the minimum and maximum score one could get is 18 and 90, respectively. The perception score of a respondent was calculated by adding up the scores obtained by him/her on all items/statements. A higher score on this scale indicates that the respondent has a better perception of MOVCDS. Based on the total cumulated score obtained, the aromatic black rice growers were classified into three categories *viz.*, poor, good, and better level of perception based on the mean and half standard deviation.

Sl. No.	Perception categories	Production component (score)	Supporting component (score)	Processing and marketing component (score)	Overall perception (score)
1	Poor (Below Mean- ½ SD)	<15.37	<15.42	<11.09	<41.87
2	Good (Mean± ½ SD)	15.37 - 17.85	15.42 - 18.02	11.09 - 13.09	41.87 - 48.97
3	Better (Above Mean + ½ SD)	>17.85	>18.02	>13.09	>48.97
Mean		16.61	16.72	12.09	45.42
Standard deviation		2.49	2.60	2.00	7.09

The perception of aromatic black rice growers towards MOVCDS was considered as the dependent variable for the study. Information regarding 20 profile characteristics (independent variables) of aromatic black rice growers was collected using a structured schedule with suitable scales. The collected data were scored, tabulated, and analysed using frequency, mean, percentage, chi-square test, and multiple regression analysis.

Results and Discussion

1. Statement-wise perception of aromatic black rice growers towards MOVCDS

Table I presents the findings on the statement-wise perception of aromatic black rice growers towards MOVCDS. With respect to the production component, a vast majority of the aromatic black rice growers (83.33%) had 'strongly agreed' to the positive statement 'MOVCDS aims at the development of certified organic production in a value chain mode'. Whereas, .majority of the aromatic black rice growers had 'strongly disagreed' to the negative statements such as (a) More number of black rice growers have shifted from organic to chemical farming after the implementation of MOVCDS (82.22%), (b) crop planning and time management are not followed effectively by black rice growers by participating in the value chain activities of MOVCDS (80.55%), (c) MOVCDS facilitate farmers with an untimely supply of quality seeds (70.56%), (d) MOVCDS is emphasizing the farmers to use less of organic manure to black rice (73.33%), and (e) MOVCDS is advocating excessive use of inorganic fertilizers to black rice (78.33%).

In the respect of supporting components, more than two-thirds of the aromatic black rice growers had 'strongly agreed' for the positive statements such as (a) MOVCDS develops rice production clusters with necessary infrastructural, technical and financial support (80.00%), (b) MOVCDS empowers black rice growers with program ownership by organizing them into farmers interest groups at village level and federated into farmers producers companies at district level (78.88%), (c) outreach activities (demonstrations, training, field visits, field days, etc.) of MOVCDS has increased the adoption of more organic farming practices (71.66%), and (d) farmers cluster provides an opportunity for its members to develop leadership qualities (66.60%). While over 70 per cent of the aromatic black rice growers had 'strongly disagreed' for the negative statements like (a) farmers clusters has not provided platform for sharing experience among the members (81.11%),

and (b) participating in value chain activities of MOVCDS has not helped the black rice growers to have strong research and extension linkages (72.22%).

With regard to the processing and marketing component, a majority of the aromatic black rice growers had 'strongly agreed' for the following positive statements: (a) MOVCDS enables Manipur to evolve its own brand for organic black rice (81.13%), (b) MOVCDS has organized trade fairs/organic festivals for effective marketing of organic black rice among trading fraternity and value chain operators (77.22%), and (c) MOVCDS has created awareness among the public by giving wide publicity through printed literature, films and local advertisements for promoting the sale of organic black rice (71.66%). It was very interesting to note that less than half of the aromatic black rice growers had 'strongly agreed' for the positive statements viz., (a) MOVCDS markets the organic produce through direct retail, farmer markets, on-line chain and tying up with domestic retail chains and exporters (47.78%), and (b) MOVCDS facilitates partnerships and trade relations between farmers producers companies and organic businesses for promoting domestic and exports markets (42.22%). A majority of aromatic black rice growers had 'strongly disagreed' for the negative statement 'Organic bazaars are established to function as collection centres between the farm gate and processing infrastructures (63.33%)'.

It could be observed from the above results that a majority of the aromatic black rice growers had 'strongly agreed' for almost all the positive perception statements and 'strongly disagreed' for all the negative perception statements. It could be inferred from the above results that the aromatic black rice growers had better perception towards production, supporting and processing and marketing components of MOVCDS.

Table I: Statement-wise perception of aromatic black rice growers towards MOVCDS

(n=180)

Sl. No.	Perception statements	Aromatic black rice growers				
		Strongly agree	Agree	Un-decided	Disagree	Strongly disagree
A.	Production component					
1	MOVCDS aims at development of certified organic production in a value chain mode	150 (83.33)	26 (14.46)	2 (1.11)	1 (0.55)	1 (0.55)
2	More number of black rice growers have shifted from organic to chemical farming after the implementation of MOVCDS	0 (0.00)	0 (0.00)	0 (0.00)	32 (17.7)	148 (82.22)
3	Crop planning and time management are not followed effectively by black rice growers by participating in the value chain activities of MOVCDS	0 (0.00)	0 (0.00)	0 (0.00)	35 (19.45)	145 (80.55)
4	MOVCDS facilitate farmers with untimely supply of quality seeds	1 (0.55)	2 (1.11)	0 (0.00)	47 (26.11)	130 (70.56)
5	MOVCDS is emphasizing the farmers to use less of organic manure to black rice	0 (0.00)	0 (0.00)	0 (0.00)	48 (26.67)	132 (73.33)
6	MOVCDS is advocating excessive use of inorganic fertilizers to black rice	0 (0.00)	0 (0.00)	0 (0.00)	40 (21.67)	141 (78.33)
B.	Supporting component					
7	MOVCDS empowers black rice growers with programme ownership by organizing them into Farmers Interest Groups (FIGs) at village level and federated into Farmers Producers Companies (FPCs) at district level	142 (78.88)	34 (18.91)	2 (1.11)	1 (0.55)	1 (0.55)
8	Farmers cluster provides an opportunity for its members to develop leadership qualities	120 (66.60)	43 (23.88)	7 (3.91)	4 (2.22)	6 (3.33)
9	Farmers clusters has not provided platform for sharing experience among the members	1 (0.55)	1 (0.55)	6 (3.33)	26 (14.46)	146 (81.11)
10	MOVCDS develops rice production clusters with necessary	144 (80.00)	32 (17.79)	2 (1.11)	1 (0.55)	1 (0.55)

	infrastructural, technical and financial support					
11	Participating in value chain activities of MOVCDS has not helped the black rice growers to have strong research and extension linkages	2 (1.11)	2 (1.11)	5 (2.77)	41 (22.79)	130 (72.22)
12	Outreach activities (demonstrations, training, field visits, field days etc.) of MOVCDS has increased the adoption of more organic farming practices	129 (71.66)	49 (27.24)	1 (0.55)	0 (0.00)	1 (0.55)
C.	Processing and marketing component					
13	Organic bazaars are established to function as collection centers between the farm gate and processing infrastructures	8 (4.44)	10 (5.56)	12 (6.67)	36 (20.00)	114 (63.33)
14	MOVCDS facilitates partnerships and trade relations between FPCs and organic businesses for promoting domestic and exports markets	76 (42.22)	54 (30.00)	22 (12.22)	12 (6.67)	16 (8.89)
15	MOVCDS has created awareness among public by giving wide publicity through printed literature, films and local advertisements for promoting the sale of organic black rice	129 (71.66)	49 (27.24)	1 (0.55)	0 (0.00)	1 (0.55)
16	MOVCDS markets the organic produce through direct retail, farmer markets, on-line chain and tying up with domestic retail chains and exporters	86 (47.78)	60 (33.33)	20 (11.11)	8 (4.44)	6 (3.33)
17	MOVCDS has organized trade fairs/organic festivals for effective marketing of organic black rice among trading fraternity and value chain operators	139 (77.22)	32 (17.79)	6 (3.33)	1 (0.55)	2 (1.11)
18	MOVCDS enables Manipur to evolve its own brand for organic black rice	146 (81.13)	26 (14.44)	5 (2.77)	2 (1.11)	1 (0.55)

Figure in parenthesis indicates percentage

2. Overall perception of aromatic black rice growers towards Manipur Organic Value Chain Development Scheme

The results in Table II presents the data on the perception of aromatic black rice growers towards different components of MOVCDS and also the overall perception towards MOVCDS. It is found that a larger number of aromatic black rice growers had better perception towards the production component of MOVCDS (48.90%), whereas 40.55 and 10.55 per cent of the aromatic black rice growers had good and poor perception towards the production components of MOVCDS, respectively. It could be inferred from the research results that an overwhelming number of aromatic black rice growers (89.45%) had good to better perception towards the production component of MOVCDS. The scheme has advocated the farmers to follow crop planning and time management, facilitated farmers in providing timely supply of quality seeds, emphasized the minimum use and maximum use of inorganic fertilizer and organic manures, and aimed at development of certified organic production in a value chain mode, hence an overwhelming number of aromatic black rice growers (89.45%) had good to better perception towards the production component of MOVCDS.

Table II reveals that a little over half of the aromatic black rice growers had better perception towards the supporting component of MOVCDS (50.01%), followed by 38.33 and 11.66 per cent of them having good and poor perception towards the supporting component of MOVCDS, respectively. It could be interpreted that a greater majority of aromatic black rice growers (88.34%) had good and poor perception towards the supporting component of MOVCDS. The scheme has empowered the respondents through the programme ownership, developed leadership qualities, and provided the platform for sharing experiences by organizing them into farmers interest groups at the village level and federated into farmers producers companies at the district level, developed rice production clusters with necessary infrastructural, technical and financial support and also the scheme had organised a good number of outreach activities for dissemination of organic rice farming practices, therefore a greater majority of aromatic black rice growers (88.34%) had good and poor perception towards the supporting component of MOVCDS.

A little over one-third of the aromatic black rice growers were having better perception (33.90%) towards the processing and marketing component of MOVCDS, while one-third of them were having poor perception (33.33%) and the remaining respondents were having good perception (32.77%) towards the processing and marketing component of MOVCDS (Table II).Under the scheme, awareness was created among the stakeholders by giving wider publicity for promoting the sale of organic black rice, organised trade fairs/organic festivals, and had enabled Manipur to evolve its own brand for organic black rice, as a consequence, 33.39 and 32.77 per cent of the aromatic black rice growers were having better and good perception towards MOVCDS, respectively. On the other hand, one-third of the aromatic black rice growers (33.33%) had poor perception towards MOVCDS, because the scheme had often failed in developing the partnerships and trade relations between farmers producers companies and organic businesses for promoting domestic and exports markets.

The results in Table II further reveals that in respect of the overall perception towards MOVCDS, a greater proportion of the aromatic black rice growers (44.45%) had better overall perception, whereas more than one-third (37.22%) and less than one-fifth (18.33%) of them had good and poor perception towards MOVCDS. As high as 81.77 per cent of the aromatic black rice growers had good to better perception towards MOVCDS. Organizing farmers into farmer interest groups, timely availability of organic inputs, effective crop planning, accessibility of agricultural extension personnel and service providers, adequate opportunities to participate in extension activities, etc., are the reasons for a vast majority (81.67%) of the aromatic black rice growers for having good to better overall perception towards MOVCDS. On the other hand, aromatic black rice growers perceived the scheme to be failing in meeting their expectations in terms of executing the activities such as organising farm bazaars and linking farmers with market, hence 18.23 per cent of the respondents had poor overall perception towards MOVCDS. The present findings are in line with the findings of the study conducted by Duhan (2017), Preethi *et. al*. (2017) and Philip and Sivaraj (2018).

Table II: Perception of aromatic black rice growers towards different components of MOVCDS (n=180)

Sl. No	MOVCDS components	Perception categories						Mean	SD
		Poor		Good		Better			
		No.	%	No.	%	No.	%		
1	Production component	19	10.55	75	40.55	88	48.90	16.61	2.49
2	Supporting component	21	11.66	69	38.33	90	50.01	16.72	2.60
3	Processing and marketing component	60	33.33	59	32.77	61	33.39	12.09	2.00
Overall perception		33	18.33	67	37.22	80	44.45	45.42	7.09

3. Association and extent of contribution of profile characteristics of aromatic black rice growers on the perception towards MOVCDS

3.1. Association between profile characteristics of aromatic black rice growers with the perception towards MOVCDS

The association between the profile characteristics of aromatic black rice growers with the perception towards MOVCDS is presented in Table III. It could be observed from the results that 14 out of 20 independent variables were found to have a significant to highly significant association with the perception of aromatic black rice growers towards MOVCDS. Age, family size, land holding, annual income, fallow period, and material possession of aromatic black rice growers had a non-significant association with their perception towards MOVCDS, whereas education, organic farming experience, livestock possession, crop productivity, achievement motivation, aspiration, management orientation, economic motivation, risk orientation, innovative proneness, mass media exposure and training on organic farming of aromatic black rice growers were found to have a significant association with their perception towards MOVCDS at five per cent level of probability. The variables such as extension agency contact and extension participation of aromatic black rice growers had a highly significant association with their perception towards MOVCDS at one per cent level of probability. The finding was in line with the findings reported by Kangale *et al.* (2016) and Darshan *et al.* (2019).

The explanations for the profile characteristics having significant to highly significant association with the perception level is explained in the ensuring paragraphs.

3.1.1. Education and perception level: The chi-square test revealed a significant association between education of the aromatic black rice growers with their perception towards MOVCDS at five per cent level. Education enables the aromatic black rice growers to be more receptive of the interventions put forward by MOVCDS. It also enables the aromatic black rice growers to comprehend the activities of MOVCDS for promoting the organic aromatic black rice production through different production, supporting and processing and marketing components of MOVCDS, leading to better perception of respondents towards MOVCDS.

3.1.2 Organic farming experience and perception level: A significant association was existing between organic farming experience of the aromatic black rice growers and their perception towards MOVCDS. The association is quite obvious because an aromatic black rice grower with a prior experience in organic farming could able to understand the organic farming practices advocated under MOVCDS in an effective and efficient way, as a consequence the respondents have developed better perception towards MOVCDS.

3.1.3 Livestock possession and perception: There exist a significant association between the livestock possession and perception of aromatic black rice growers towards MOVCDS. The scheme promotes establishing on-farm production units like liquid manure tanks etc. for which livestock are required for preparing liquid manure. Since, the MOVCDS is providing an assistance of Rs. 3750 per ha could be availed for the establishment of on-farm input production unit, the aromatic black rice growers have developed better perception towards MOVCDS.

3.1.4 Crop productivity and perception level: A significant association exists between crop productivity of the respondents with their perception towards MOVCDS. The aromatic black rice growers with better perception towards MOVCDS are likely to follow organic farming technologies advocated under the scheme resulting in getting higher yield and income.

3.1.5 Achievement motivation and perception level: The study reveals that there exist a significant association between achievement motivation and perception of aromatic black rice growers towards MOVCDS. The achievement of an individual is associated in excelling in farming and thereby attaining a sense of successful accomplishment. To achieve this distinction, the aromatic black rice growers would have availed the benefits of MOVCDS in the form of obtaining technical guidance on organic farming and timely supply of organic inputs.

3.1.6 Aspiration and perception level: There was a significant association exist between the perception of aromatic black rice growers with their aspiration level. The aromatic black rice growers aspire to bring about improvement in their standard of living by actively involving in the activities of MOVCDS. Their aspiration has made them reach out to extension agents and participate in extension activities of MOVCDS for obtaining good crop yield and income related activities. The above reasons may have helped the respondents in forming a better perception towards the scheme.

3.1.7 Management orientation and perception level: The urge of the respondents to perform better compare to others will act as an instrument to adopt the managerial activities relating to organic farming. MOVCDS is promoting crop planning and time management by motivating the respondents to actively participate in the value chain activities of MOVCDS. Hence, the management orientation and perception towards MOVCDS have significant association with one another.

3.1.8. Economic motivation and perception level: A significant association exist between economic motivation of the aromatic black rice growers with their perception towards MOVCDS at five per cent level. The major motto of the aromatic black rice growers is to improve their economic condition by availing the benefits of MOVCDS. The respondents have availed the incentives and financial assistance regarding on-farm production inputs, off-farm inputs and seeds, besides getting good price for the produce.

3.1.9 Risk orientation and perception level: Risk orientation of aromatic black rice growers and perception towards MOVCDS has a significant association. The various risks involved in organic farming include risks of scarcity of organic manure, water scarcity, drought, pests and diseases, market failure etc. In this context, aromatic black rice growers with

more risk orientation will be regularly contacting agricultural extension functionaries for receiving timely information related to organic farming, obtaining subsidy/financial assistance for on and off farm inputs, agricultural insurance, weather forecasting, marketing facilities etc.

3.1.10 Innovative proneness and perception level: The interest of the farmers to adopt the current and new organic farming practices predisposes them to seek additional information from the extension functionaries of MOVCDS, hence there exist a significant association between innovative proneness of aromatic black rice growers and perception level.

3.1.11 Mass media exposure and perception level: Mass media exposure and perception of the aromatic black rice growers towards MOVCDS were having a significant association The authorities of MOVCDS have advertised in both print and electronic media regarding the benefits of cultivating organic farming and the advantages of farmers joining MOVCDS. Exposure to mass media by the farmers has given an opportunity for the aromatic black rice growers to get aware about the activities of MOVCDS in promoting organic farming.

3.1.12 Training on organic farming and perception level: The significant association between training on organic farming and perception towards MOVCDS was obvious because participation of respondents in the training programmes on organic farming has given an opportunity to acquaint themselves not only on the organic farming practices of aromatic black rice but also on the various benefits of MOVCDS.

3.1.13 Extension agency contact and perception level: The agricultural extension personnel working in MOVCDS has disseminated the organic farming practices to be followed by the beneficiaries various incentives available under the scheme, marketing facilities for the crop produce etc., hence there is a highly significant association exist between extension agency contact of black rice growers and perception level.

3.1.14 Extension participation and perception level: The participation of aromatic black rice growers in the extension activities (conventions, field days, demonstrations, field days, exhibitions etc.) has motivated the respondents to participate and avail the benefits under

MOVCDS. As a consequence, there exist a highly significant association between extension participation of aromatic black rice growers and perception level.

Table III: Association between profile characteristics of aromatic rice growers with their perception towards MOVCDS

(n=180)

Sl. No.	Characteristics	Degree of freedom	Chi-square value	Contingency coefficient
1	Age	4	2.61 ^{NS}	0.06
2	Education	4	10.62*	0.25
3	Family size	4	0.99 ^{NS}	0.02
4	Land holding	4	4.64 ^{NS}	0.12
5	Annual income	4	5.61 ^{NS}	0.13
6	Fallow period	4	2.29 ^{NS}	0.07
7	Organic farming experience	4	10.11*	0.24
8	Livestock possession	4	11.28*	0.27
9	Material possession	4	3.69 ^{NS}	0.09
10	Crop productivity	4	12.99*	0.27
11	Achievement motivation	4	11.01*	0.27
12	Aspiration	4	10.88*	0.26
13	Management orientation	4	11.66*	0.29
14	Economic motivation	4	12.68*	0.30
15	Risk orientation	4	12.22*	0.29
16	Innovative proneness	4	10.50*	0.26
17	Mass media exposure	4	10.58*	0.25
18	Training on organic farming	4	9.92*	0.21
19	Extension agency contact	4	13.61**	0.33
20	Extension participation	4	13.90**	0.34

NS= non-significant, *=Significant at 5%, **= Significant at 1%

4. Extent of contribution of profile characteristics of aromatic black rice growers on the perception towards MOVCDS

The results in Table IV reveals that age, family size, land holding, annual income, fallow period and material possession of aromatic black rice growers were not significantly contribution to the development of better perception towards MOVCDS, whereas variables such as education, organic farming experience, livestock possession, crop productivity, achievement motivation, aspiration, management orientation, economic motivation, risk orientation, innovative proneness, mass media exposure, training on organic farming, extension agency contact and extension participation have synergic effect on one another leading to significantly to highly significantly contributing in developing better perception towards MOVCDS among aromatic black rice growers. All the 20 personal, socio-economic, psychological, and communication characteristics of aromatic black rice growers had contributed to the tune of 71.69 per cent (R^2=0.7169) in developing better perception towards MOVCDS.

Table IV: Extent of contribution of profile characteristics of aromatic black rice growers on the perception towards MOVCDS

(n=180)

Sl. No.	Characteristics	Regression coefficient	SE of Regression coefficient	't' value
1	Age	0.06	0.12	0.51^{NS}
2	Education	0.31	0.69	2.21*
3	Family size	0.32	0.09	0.28^{NS}
4	Land holding	0.47	0.18	0.38^{NS}
5	Annual income	0.50	0.21	0.42^{NS}
6	Fallow period	0.41	0.22	0.53^{NS}
7	Organic farming experience	0.32	0.72	2.21*
8	Livestock possession	0.30	0.70	2.33*
9	Material possession	0.19	0.18	0.92^{NS}

10	Crop productivity	0.07	0.20	2.52*
11	Achievement motivation	0.35	0.81	2.31*
12	Aspiration	0.24	0.59	2.42*
13	Management orientation	0.34	0.72	2.11*
14	Economic motivation	0.30	0.69	2.33*
15	Risk orientation	0.32	0.70	2.16*
16	Innovative proneness	0.35	0.69	2.00*
17	Mass media exposure	0.29	0.72	2.44*
18	Training on organic farming	0.32	0.81	2.50*
19	Extension agency contact	0.29	0.89	3.01*
20	Extension participation	0.36	0.92	2.51*

NS= non-significant, *=Significant at 5%, **= Significant at 1%, $R^2 = 0.7169$

Conclusion

The research results revealed that a vast majority of 81.77 per cent of the aromatic black rice growers had good to better level of perception towards MOVCDS, while 18.23 per cent of the aromatic black rice growers had poor perception towards MOVCDS because of poor marketing strategies adopted by MOVCDS. Hence, there is a need by the authorities of MOVCDS to develop the partnerships and trade relations between farmers producers companies and organic businesses for promoting domestic (marketing of organic rice through farmers markets, direct retail, farmer and on-line chains) and export markets for organically grown aromatic black rice. The MOVCDS should provide adequate opportunities to the aromatic black rice growers to participate in extension activities and publish /broadcast /telecast the activities of MOVCDS which will further help the aromatic black rice growers in developing better perception towards MOVCDS.

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