

**A STUDY ON IMPACT OF SOIL HEALTH CARD SCHEME
ON NUTRIENT MANAGEMENT PRACTICES IN MAJOR
RABI CROPS AMONG THE FARMERS OF MUNGELI
DISTRICT OF CHHATTISGARH**

M.Sc. (Ag) Thesis

by

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**DEPARTMENT OF AGRICULTURAL EXTENSION
COLLEGE OF AGRICULTURE
FACULTY OF AGRICULTURE
INDIRA GANDHI KRISHI VISHWAVIDYALAYA
RAIPUR (Chhattisgarh)**

2021

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ON NUTRIENT MANAGEMENT PRACTICES IN MAJOR
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DISTRICT OF CHHATTISGARH**

Thesis

Submitted to the

Indira Gandhi Krishi Vishwavidyalaya, Raipur

by

Mahesh Kumar

**IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
DEGREE OF**

Master of Science

in

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CERTIFICATE - I

This is to certify that the thesis "A Study on Impact of Soil health card Scheme on Nutrient Management Practices in Major Rabi Crops Among the Farmers of Mungeli District of Chhattisgarh" submitted in partial fulfilment of the degree of Master of Science in Agriculture of the Indira Gandhi Krishi Vishwavidyalaya, Raipur, is a record of the bonafide research work carried out by Mahesh Kumar under my guidance and supervision. The subject of the thesis has been approved by student's Advisory Committee and Director of Instructions.

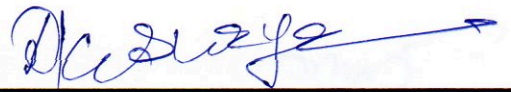
No part of the thesis has been submitted for any other degree or diploma or certificate course. All the assistance and help received during the course of the investigations have been duly acknowledged by him.


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Date: 23/07/2021

THESIS APPROVED BY THE STUDENT'S ADVISORY COMMITTEE

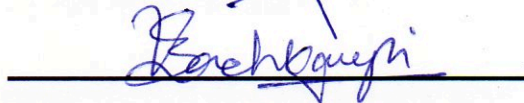
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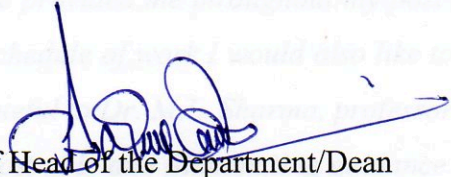


Member (Dr. Sindhu Shukla)



CERTIFICATE- II

This is to certify that the thesis entitled “A Study on Impact of Soil health card Scheme on Nutrient Management Practices in Major Rabi Crops Among the Farmers of Mungeli District of Chhattisgarh” submitted by Mahesh Kumar to the Indira Gandhi Krishi Vishwavidyalaya, Raipur, in partial fulfilment of the requirements for the degree of Master of Science in Agriculture in the Department Agricultural Extension has been approved by the external evaluator and Student’s Advisory Committee after oral examination, under the chairmanship of Head of the Department/Dean (in case of out of compii)

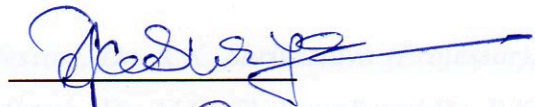

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LIST OF SYMBOLS AND ABBREVIATIONS

ABBREVIATIONS	DESCRIPTIONS
%	Per cent
@	At the rate of
Cm	Centimeter
et al	Et alii (and other)
Fig	Figure
Ha	Hectare
i.e.,	id est (that is)
t/ha	Tonne per hectare
Viz.	Namely
BD	Below recommended dose
EC	Electrical conductivity
DAP	Di Ammonium phosphate
FYM	Farm yard manure
MOP	Muriate of Potash
NPK	Nitrogen, Phosphorus, and Potassium
FAO	Food and Agricultural Organization
GOI	Government of India
IISS	Indian Institute of Soil Science
INM	Integrated Nutrient Management
IUSS	International Union of Soil Science
KVK	Krishi Vigyan Kendra
NSS	National Academy of Agricultural Sciences

NCS	Northeast coalition of states
NMSA	National Mission for Sustainable Agriculture
Qtl/ha	Quintal per hectare
RAEO	Rural Agricultural Extension Office
RD	Recommended dose percent
SHC	Soil Health Card
SHM	Soil Health Management
TV	Television
UN	United Nations
USDA	United State Department of America

THESIS ABSTRACT

- a) Title of the Thesis : A Study on Impact of Soil health card Scheme on Nutrient Management Practices in Major Rabi Crops Among the Farmers of Mungeli District of Chhattisgarh
- b) Full Name of the Student : Mahesh Kumar
- c) Major Subject : Agricultural Extension
- d) Name and Address of the Major Advisor : Dr. D.K. Suryawanshi
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- e) Degree to be awarded : M.Sc. (Ag) Agricultural Extension

Signature of the Major Advisor

Date: 23/07/2021

Signature of the Student

Signature of the Head of the Department

ABSTRACT

The present study was carried out during 2020-2021 at the Mungeli district of Chhattisgarh due to its maximum SHC respondent coverage. Out of 3 blocks, Mungeli, Lormi and Patharia block were purposively selected for the study purpose. From each block 4 villages were selected randomly from each selected block. So total 12 villages (4x3=12) were selected randomly based on maximum availability of soil health card holders in the villages, and in each selected village, 10 SHC respondents (Total 10x12=120) were selected randomly as respondents. Thus, for the research, a total of 120 respondents were selected. Using a well-structured pre-tested interview schedule via personal interview, the information was collected.

The results of the study showed that majority of the SHC respondents were of middle age having 36-55 years old and were studied up to higher and higher secondary School. Were depending only on agriculture for their living and Most of the respondent had (up to 1) hectare of land is marginal land holding and medium size of family with 5 to 8 members and come under medium size of family the majority of the SHC respondents had high. farming experience

(above 20 years) Most of the SHC respondent's annual income was between Rs. 100000 to 250000,

The innovativeness of the SHC respondents found that majority of the respondents were medium level innovative (83.00%) having low level economic motivation, and were low cosmopolite. Most of the SHC respondents (65.83%) were information seeking behaviour information from Krishi Vigyan Kendra (KVK) on regular basis as regarded to characteristics of the SHC farmland land owned by the respondents majority SHC respondents were use of micronutrients Zink 75.00% applied in wheat crop and 91.67% SHC respondents applied Zink in chickpea crops majority of the SHC respondent were Cropping intensity is more than 200% and the results obtained shows that the area, (14.05 ha) production and productivity under crop of is more than the chickpea crop covered,

The results found that 5 selected practices of recommended SHC based nutrients managements practices and among all the respondents the number of respondents and the different level of adoption categories such as in application of nutrients in wheat crops DAP majority (87.50%) of the respondents had recommended dose adopted followed by application of plants nutrients (FYM) farm yard manure (85.83%) of the respondents had recommended dose adopted and only (66.67%) of respondents had recommended dose Urea and application of plant nutrients followed by (77.50%) of the respondent had recommended dose adopted Zink and (80.83%)of the respondents had recommended dose of nutrients

adopted MOP in wheat crops maximum 40.00% of the respondents had below recommended dose, adopted Urea followed by 22.50% of the respondents had below recommended dose adopted Zink and only 19.17% of the respondents had below recommended dose MOP followed by 14.17% of the respondents had below recommended dose adopted FYM (farm yard manure) about (12.50%) of the respondents had below recommended dose adopted DAP

In case of chickpea crops application of plant nutrients Rhizobium majority (91.67%) of the respondents had recommended dose adopted followed by application of plants nutrients MOP (87.50%) of the respondents had recommended dose adopted and only (69.17%) of respondents had recommended dose adopted DAP Followed by (81.67%) of the respondents had recommended dose adopted Urea and (55.83%) of the respondents had recommended dose adopted Zink in chickpea crop maximum 44.17% of the respondents had below recommended adopted Zink nutrients followed by (30.83%) of the respondent had below recommended dose adopted DAP and only (18.33%) of the respondent had below recommended dose adopted urea followed by (8.33%) of the respondents had below recommended dose adopted rhizobium

Application of recommended and applied dose (%) of plant nutrients in major rabi crops the results of the study showed observed that there was significant influence of dose of per cent among different plant nutrients. In wheat crop, the difference dose of per cent in different nutrients viz. Urea, DAP, MOP, Rhizobium and farm yard manure were 81, 95.12, 96.23, 59.49 and 38.33 %, respectively. Similarly, in chickpea crop, the dose of per cent varied from 87.17, 87.68, 75.51, 65.79, 36.25 and 65.02 %, respectively. Overall, the average dose of per cent for wheat was 62.44% whereas in chickpea it was 43.42 % on the basis of recommended soil health card nutrient management practices in major rabi crops

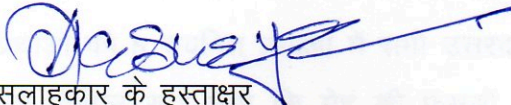
The correlation of average application of plant nutrients of recommendation of soil health card by the respondent was given in it with all the variable's all the variables showed that out of all variables that out of all six education, annual income, land holding, source of information, soil type, productivity, variables showed positive correlation with average application of plant nutrients was significance at 0.01 probability level whereas only one variables use of nutrients was significant at 0.05 probability level and eight variables age, family size, farming experience, occupation, cosmopolitaness economic motivation, innovativeness cropping intensity was not significant in case of wheat crop

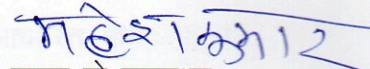
The analysis on constraints showed that majority of SHC respondents were facing difficulty in understanding the information given in SHC without the assistance of an agriculture / extension officer, followed by lack of knowledge about what is SHC and its use even after receiving the card, unavailability of SHC before crop season and another few respondents faced problem was high cost of fertilizers (recommended in SHC).

The suggestions given by the SHC respondents showed that most of them wanted RAEO should come before sowing to content/ recommendation of SHC, followed by SHC should be given personally to the farmers and should made available on time, followed by training should be given on proper method of collecting soil sample. Some respondents also suggested that method of fertilizer application should be given.


शोधग्रंथ सारांश

- अ) शोधग्रंथ का शीर्षक : छत्तीसगढ़ राज्य के मुंगेली जिले के किसानों के बीच प्रमुख रबी फसलों में पोषक तत्व प्रबंधन प्रथाओं पर मृदा स्वास्थ्य कार्ड योजना के प्रभाव पर अध्ययन
- ब) छात्रा का नाम : महेश कुमार
- स) प्रमुख विषय : कृषि विस्तार
- द) मुख्य सलाहकार का नाम एवं पता : डॉ. डी.के.सूर्यवंशी (वरिष्ठ वैज्ञानिक)
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कृषि महाविद्यालय, रायपुर (छ.ग.)
- इ) उपाधि का नाम : एम. एस.सी. (कृषि) कृषि विस्तार


मुख्य सलाहकार के हस्ताक्षर


छात्रा के हस्ताक्षर

दिनांक 23/07/2021


विभागाध्यक्ष के हस्ताक्षर

सारांश

वर्तमान अध्ययन छत्तीसगढ़ राज्य के मुंगेली जिले में वर्ष 2020-21 के दौरान किया गया। इस अध्ययन में चयनित जिले के 3 विकासखण्ड में से मुंगेली, लोरमी और पथरिया विकासखण्ड को अभिप्राय पूर्वक अध्ययन के लिए चुना गया। प्रत्येक विकासखण्ड से चार गांवों को यादृच्छिक रूप से प्रत्येक चयनित विकासखण्ड से चुना गया था, इसलिए कुल 12 गांवों (4X3=12) को गांवों में मृदा स्वास्थ्य कार्ड धारकों की अधिकतम उपलब्धता के आधार पर यादृच्छिक रूप से चुना गया था, और प्रत्येक चयनित गांव में 10 एस एच सी उत्तरदाताओं (कुल 10X12=120) को उत्तरदाताओं के रूप में यादृच्छिक रूप से चुना गया था। इस प्रकार शोध के लिए कुल 120 उत्तरदाताओं का चयन किया गया। आंकड़ों का विश्लेषण जैसे आवृत्ति, प्रतिशत, अर्थ, व्यक्तिगत साक्षात्कार के माध्यम से एक अच्छी तरह से संरचित पूर्व-परीक्षित साक्षात्कार अनुसूची का उपयोग करके, जानकारी एकत्र की गई थी।

अध्ययन के नतीजे यह बताते हैं कि मृदा स्वास्थ्य कार्ड अधिकांश उत्तरदाताओं आयु (36-55 वर्ष) के मध्य आयु के थे और उच्च एवं उच्चतर माध्यमिक शिक्षा का स्तर पाया गया। केवल अपने जीवन यापन के लिए कृषि पर आधारित थे और अधिकांश उत्तरदाताओं के पास (1 हेक्टेयर तक) भूमि किसान सीमांत भूमि जोत और मध्यम आकार के परिवार के साथ 5-8 सदस्य थे और परिवार के मध्यम आकार

के अंतर्गत आते थे, जिनमें से अधिकांश मृदा स्वास्थ्य कार्ड उत्तरदाताओं के पास था तथा उच्च कृषि कार्यों में अनुभव 20 वर्ष से अधिक का रखते थे, अधिकांश मृदा स्वास्थ्य कार्ड उत्तरदाताओं की वार्षिक आय 100000 – 250000 रुपये के बीच थी। उत्तरदाताओं की नवीनता से पता चलता है कि अधिकांश उत्तरदाता मध्यम स्तर के नये विचार के थे। (83.00%) निम्नस्तर की आर्थिक प्रेरणा वाले थे, और कम अनुभवी थे अधिकांश मृदा स्वास्थ्य कार्ड उत्तरदाताओं (65.83%) नियमित रूप से कृषि विज्ञान केन्द्र से जानकारी प्राप्त करने वाले थे। बहुसंख्यक मृदा स्वास्थ्य कार्ड उत्तरदाताओं के स्वामित्व वाली कृषि भूमि की विशेषताएँ सूक्ष्म पोषक तत्वों का उपयोग थीं, जिनके 75.00% गेहूँ की फसल में डाला गया था और 91.67% मृदा स्वास्थ्य कार्ड उत्तरदाताओं ने चना फसलों में जिनके डाला गया था, अधिकांश मृदा स्वास्थ्य कार्ड उत्तरदाताओं की फसल सघनता 200% से अधिक थी और प्राप्त परिणामों से पता चलता है कि क्षेत्र में चने की फसल की उत्पादकता (14.05 हेक्टेयर) थी।

अध्ययन के परिणामों से पता चला है कि अनुशासित मृदा स्वास्थ्य कार्ड आधारित पोषक तत्व प्रबंधन प्रथाओं की 5 चयनित प्रथाओं में सभी उत्तरदाताओं के बीच उत्तरदाताओं की गोद लेने की संख्या श्रेणियों के विभिन्न स्तर जैसे कि गेहूँ की फसलों में पोषक तत्वों के आवेदन में डी ए पी का बहुमत उत्तरदाताओं ने खुराक की सिफारिश के अनुसार (87.50%) था, जिसके बाद पौधों के पोषक तत्वों का प्रयोग में गोबर की खाद (85.83%) उत्तरदाताओं ने खुराक की सिफारिश की थी और केवल (66.67%) उत्तरदाताओं ने यूरिया की खुराक और पौधों के पोषक तत्वों के आवेदन की सिफारिश की थी (77.50%) उत्तरदाताओं ने जिनके की खुराक की सिफारिश की थी (80.83%)।

गेहूँ की फसल में मृदा स्वास्थ्य कार्ड उत्तरदाताओं का एम ओ पी का 40.00% अनुशासित खुराक से कम अपनाया गया तथा अधिकतम उत्तरदाताओं ने अनुशासित खुराक से कम 22.50% यूरिया अपनाया था, इसके बाद उत्तरदाताओं ने अनुशासित खुराक से कम 19.17% जिनके को अपनाया था और उत्तरदाताओं ने अनुशासित खुराक से कम 14.17% एम ओ पी अपनाया था। अनुशासित खुराक से कम एफ वाई एम (फार्म यार्ड खाद) लगभग (12.50%) उत्तरदाताओं ने अनुशासित खुराक से कम डी.ए.पी.को अपनाया था।

चना फसलों के मामले में पौधों के पोषक तत्वों के आवेदन राइजोबियम बहुमत (91.67%) उत्तरदाताओं ने खुराक की सिफारिश की थी और पौधों के पोषक तत्वों के आवेदन के बाद एम ओ पी (87.50%) उत्तरदाताओं ने खुराक की सिफारिश की थी और केवल (69.17%) उत्तरदाताओं ने सिफारिश की थी डी ए पी अपनाई गई थी। खुराक (81.67%) उत्तरदाताओं ने यूरिया की खुराक की सिफारिश की थी और (55.83%) उत्तरदाताओं ने चने की फसल में जिनके की खुराक अपनाने की सिफारिश की थी, अधिकतम 44.17% उत्तरदाताओं ने जिनके पोषक तत्वों को अपनाने की सिफारिश की थी और उसके बाद (30.83%) ने सिफारिश की थी। प्रतिवादी के पास अनुशासित खुराक से कम डी ए पी अपनाई गई थी

और प्रतिवादी के केवल (18.33%) ने अनुशंसित खुराक से कम यूरिया को अपनाया था और उसके बाद (8.33%) उत्तरदाताओं ने अनुशंसित खुराक से कम राइजोबियम को अपनाया था।

प्रमुख रबी फसलों में पौधों के पोषक तत्वों की अनुशंसित और अनुप्रयुक्त खुराक प्रतिशत का प्रयोग अध्ययन के परिणामों से पता चला कि विभिन्न पौधों के पोषक तत्वों के बीच प्रतिशत की खुराक का महत्वपूर्ण प्रभाव था। गेहूँ की फसल में विभिन्न पोषक तत्वों में प्रतिशत का अंतर। यूरिया, डीएपी, एम ओ पी, राइजोबियम और फार्म यार्ड खाद क्रमशः 81, 95.12, 96.23, 59.49 और 38.33 प्रतिशत रहे। इसी प्रकार, चने की फसल में प्रतिशत की मात्रा क्रमशः 87.17, 87.68, 75.51, 65.79, 36.25 और 65.02: से भिन्न थी। कुल मिला कर, गेहूँ के लिए प्रतिशत की औसत खुराक 62.44: थी जबकि प्रमुख रबी फसलों में अनुशंसित मृदा स्वास्थ्य कार्ड पोषक प्रबंधन प्रथाओं के आधार पर चना की फसल में यह 43.42% था।

उत्तरदाताओं द्वारा मृदास्वास्थ्य कार्ड की सिफारिश के पादप पोषकतत्वों के औसत अनुप्रयोग का सहसंबंध इसमें दिया गया था जिसमें सभी चरों से पता चलता है कि सभी 6 चर शिक्षा, वार्षिक आय, भूमि जोत, सूचना के स्रोत, मिट्टी के प्रकार, उत्पादकता में से सभी चरों में से चर ने दिखाया कि पौधों के पोषक तत्वों के औसत अनुप्रयोग के साथ सकारात्मक सहसंबंध 0.01 संभाव्यता स्तर पर महत्व था जबकि पोषक तत्वों का केवल एक चर उपयोग 0.05 संभाव्यता स्तर पर महत्वपूर्ण था और आठ चर आयु, परिवार का आकार, खेती का अनुभव, व्यवसाय, महानुभव आर्थिक प्रेरणा, नवीनता फसल तीव्रता थी गेहूँ की फसल के मामले में महत्वपूर्ण नहीं।

बाधाओं पर विश्लेषण से पता चला कि अधिकांश मृदा स्वास्थ्य कार्ड लाभार्थियों को कृषि / विस्तार अधिकारी की सहायता के बिना मृदा स्वास्थ्य कार्ड में दी गई जानकारी को समझने में कठिनाई का सामना करना पड़ रहा था, इसके बाद मृदा स्वास्थ्य कार्ड क्या है और कार्ड प्राप्त करने के बाद भी इसके उपयोग के बारे में जानकारी की कमी का सामना करना पड़ रहा था। फसल के मौसम से पहले मृदा स्वास्थ्य कार्ड और कुछ अन्य उत्तरदाताओं को समस्या का सामना करना पड़ा, वह थी उर्वरकों की उच्च लागत (मृदा स्वास्थ्य कार्ड में अनुशंसित)।

मृदा स्वास्थ्य कार्ड उत्तरदाताओं द्वारा दिए गए सुझावों से पता चलता है कि उनमें से अधिकांश आर ए ई ओ/ग्राम सेवकों को मृदा स्वास्थ्य कार्ड की सामग्री/सिफारिश के लिए बुवाई से पहले आना चाहिए, इसके बाद मृदा स्वास्थ्य कार्ड को व्यक्तिगत रूप से किसानों को दिया जाना चाहिए और समय पर उपलब्ध कराया जाना चाहिए, इसके बाद प्रशिक्षण दिया जाना चाहिए। मिट्टी के नमूने एकत्र करने की उचित विधि पर कुछ उत्तरदाताओं ने यह भी सुझाव दिया कि उर्वरक आवेदन की विधि दी जानी चाहिए।

CHAPTER-I

INTRODUCTION

"Swasth Dharaa, Khet Haraa" - Healthy Earth, Green Farm.

1.1 Soil Health Card

A Soil Health Card is used to assess the current state of soil health and, over time, to identify changes in soil health that are influenced by land management. A Soil Health Card displays soil health indicators as well as the descriptive terms associated with them. In most cases, the indicators are based on farmers' practical experience and knowledge of local natural resources. The card contains a list of soil health indicators that can be evaluated without the use of technical or laboratory equipment.

The soil health card scheme is one of the flagships programmers of the Government of India, which was launched on February 19, 2015. Schemes managed by the Integrated Management Division (INM) of the Ministry of Agriculture Cooperation and Farmers Welfare (AC&FW), Government of India (GoI).

Key Features of the Soil Health Card Scheme-

- ✓ The scheme is intended to cover all farmers, according to the government. The scheme will cover all the parts of the country.
- ✓ Farmers will receive a report in the form of a soil card..... and this report will include all of the specifics about their farm's soil.
- ✓ The soil card will be issued to a farm once every three years.

A step-by-step guide for guiding farmers through the process of identifying soil health indicators and developing a Soil Health Card. Facilitated farmer meetings have resulted in a user-friendly, a do-it-yourself tool for assessing soil health, and a mutually beneficial dialogue between farmers and technical experts.

SHC is a printed report that is given to a farmer for each of his holdings. It will include the status of his soil in terms of 12 parameters, including N, P, K (Macronutrients); S (Secondary-nutrients); Zn, Fe, Cu, Mn, Bo (Micronutrients);

and pH, EC, OC (Physical parameters). Based on this, the SHC will recommend fertilizer and soil amendments for the farm.

Benefits of the Soil Health Card Scheme-

- The scheme will closely monitor the farmers' soil and provide them with a formatted report. As a result, they can make informed decisions about which crops to cultivate and which to avoid.
- The soil will be monitored on a regular basis by the authorities. They will occur once every three years.
- provide farmers with a report Farmers should not be concerned if the nature of the soil changes. Due to certain factors. Also, they will always have updated data about their soil. The government's work does not end with a list of measures needed to improve soil quality. In fact, they will also hire experts to assist farmers in carrying out their tasks. The corrective actions
- The Soil Health Card Scheme will provide farmers with a detailed record of their soil's health. They can also research soil management practices. As a result, they are able to plan for the future of their crops and land.

Because of improved seed varieties, fertilizer application, and reliable irrigation, India has used intensive agriculture to achieve massive growth in food grain production. The current NPK consumption ratio in the country is. Instead of the preferred 4:2:1, the ratio is skewed at 8.2:3.2:1. There is a lot of variation. The use of fertilizers has risen from 250 kg/ha in some states to 500 kg/ha in others. 212 Punjab is a Punjabi word. Nutrient levels ranged from 207 kg/ha in Haryana to 4.8 kg/ha in Nagaland and 2 kg/ha in Arunachal Pradesh during the 2012-13 crop year. Then, in the majority of the world.

Climate change causes a shortage of primary nutrients (i.e., NPK), secondary nutrients (S), and micronutrients (B, Zn, Cu, and so on). fertilizers application in a well-balanced manner

Farmers' profitability is determined by soil quality and fertility, and the first step toward sustainable farming is applying the appropriate fertilizers doses. as well as a cropping pattern that adheres to scientific guidelines Soil monitoring, which is

based on the benefit principle, is used to ensure that fertilizers are used wisely. i.e., if all of the output factors are performing at their best and none of them are restricting, there is a more profitable answer to applied nutrients that are focused on soil testing than those that are applied haphazardly. It is a science-based and time-tested method for determining soil fertility status and is needed in order to receive a soil health card.

The soil health card (SHC) is a comprehensive evaluation of soil quality, including functional characteristics, water and nutrient content, and other biological characteristics. It outlines the steps a farmer should take to increase yield. The SHC helps farmers receive crop-specific recommendations for nutrients and fertilizers needed in each soil type. They are commanded by

The Government of India launched the Soil Health Card Scheme on February 19, 2015, with the goal of issuing soil health cards to farmers.

It makes crop-specific recommendations on the nutrients and fertilizers required by individual farms in order to assist farmers in increasing crop productivity. The judicious application of inputs. To obtain this information, all soil samples must be tested in various soil testing laboratories across the country. The experts will then evaluate the soil's strengths and weaknesses (micronutrient deficiency) and make recommendations. The outcome and suggestion will be displayed in the cards. The government intends to distribute cards to 14 crore farmers. Soil Health Card includes soil status for 12 parameters, including N, P, K (Macronutrients), S (Secondary-nutrients), Zn, Fe, Cu, Mn, B (Macronutrients), pH, electronic conductivity, and organic carbon (Physical Parameters). The Soil Health Card assists farmers in increasing productivity.

Soil Health Card Scheme was launched by the Government of India on 19th February 2015. The scheme, plans to resolve the problems of soil to farmers which will carry crop-wise recommendations of nutrients and fertilizers necessary for the individual farms to assist farmers to improve productivity through careful use of inputs. All soil samples are to be tested in different soil testing labs across the country. After that the experts will analyze the strength and weaknesses (micro-nutrients deficiency) of the soil and suggest measures to deal with it. The result and proposal will be

displayed in the cards. The government plans to provide the cards to 14 crore farmers.

The soil health card (SHC) is an analysis of the quality of the soil right from its functional characteristics to water and nutrient content and other biological properties. It contains corrective measure that a farmer should adopt to obtain a better yield. The SHC helps the farmers to get a well monitored report about the soil and they are guided by the expert to improve soil health. It also helps the farmer to get maize crop recommendation of nutrients and fertilizer required in each type of soil. This can help in increasing the maize production.

1.2 Statement of Problem

There is no doubt that the SHC scheme will raise awareness among India's farming community about the use of scientific fertilizers. However, the diffusion process of any technology used to face numerous constraints before reaching the "adoption phase" (fifth step of the diffusion process) from the awareness phase (first step of the diffusion process) for the vast majority of the targeted beneficiaries. In the case of the SHC scheme, according to government data, 106,637,251 soil health cards were distributed to farmers during the first phase of the SHC scheme (Source: soilhealth.dac.gov.in). Adoption of SHC-based fertilizers recommendations may not provide immediate benefits to farmers because it is related to the correction of soil complex processes. However, this can only be accomplished by adopting the technology over a short period of time. However, this can only be accomplished by implementing the technology over a short period of time. According to a study conducted among 100 SHC programmer beneficiaries in Gujarat's Anand district, approximately 33% of beneficiary farmers 35% of respondents had a favorable attitude toward the programmed, while 35% had a neutral attitude (Patel and Chauhan, 2012). Another study conducted in the Kurnool district of Andhra Pradesh in 2016 to assess the extent of adoption of SHC distributed during 2010-11 through the Borchetta Project revealed that approximately 67% of the beneficiary farmers adopted Scurvies surveyed expressed high levels of satisfaction with SHC-based fertilizers recommendations, but only 47% of beneficiary farmers implemented the SHC recommendation in

their farm. expressed high levels of satisfaction with SHC-based fertilizer recommendations, but only 47% of beneficiary farmers implemented the SHC recommendation in their farm. Rest The remaining farmers continued to use an excessive number of chemical fertilizers on their farmland (Chowdary and Theodore, 2016). This demonstrates that, despite being provided with the optimal fertilizers dose for their farmland, most farmers are hesitant to own the technology due to personal or technological factors. Identification of these factors is critical for developing strategies to increase the adoption of Soil Health Card-based nutrient management across the country.

1.3 Significance of the study

The study is intended to assess the impact of SHC-based fertilizer recommendations on net farm income and, as a result, to improve the livelihood of the study area's beneficiary respondent. The study will also help to understand how farmers' fertilizers use habits have changed as a result of the program me in the field. “Mungeli district of Chhattisgarh”. The results will shed light on the program's pros and cons, such as whether the scheme will produce the desired output in farmers. Whether or not people adopt nutrient management practices. If so, what are the motivating factors, and if not, what are the gaps in implementation? And also, some lessons learned in order to improve or modify the approach to make it more effective the study will also reveal whether the government's massive initiative helps farmers change their knowledge and perception of soil health and its importance in soil health maintenance. Therefore, the study will help scientists, policymakers, administrators, researchers, and other implementing agencies think about the current and future situations surrounding the Soil Health Card Scheme, indiscriminate fertilizers use, soil health, and sustainable agriculture.

In this regard the study entitled: “A STUDY ON IMPACT OF SOIL HEALTH CARD SCHEME ON NUTRIENT MANAGEMENT PRACTICES IN MAJOR RABI CROPS AMONG THE FARMERS OF MUNGELI DISTRICT OF CHHATTISGARH”

Following major objectives

1. To study the profile characteristics of the Soil Health Card holders.
2. To assess the impact of soil health card recommendation on nutrient management for the major rabi crops.
3. To study the relationship between independent and dependent variables.
4. To know the constraints during the use of nutrient management practices and to obtain the suggestions to overcome the constraints.

1.4 Limitation of the study

There are a number of factors that are either directly or indirectly related to farmers increasing their income through the use of SHC and the implementation of nutrient management practices owing to a lack of time and other resources such as money, etc. Only factors or variables that are directly related to the adoption of nutrient management practices and will have an impact on farmer income were included in the study.

CHAPTER-II

REVIEW OF LITERATURE

In line with the major objectives of the study an attempt is made to review the available national and international literature to support the present study “A study on impact of Soil Health Card scheme on nutrient management practices in major rabi crops among the farmers of Mungeli district of Chhattisgarh”. The chapter is divided in to six sub headings as follows:

- 2.1 Socio-personal characteristics
- 2.2 Socio-economic characteristics
- 2.3 Socio psychological characteristics
- 2.4 characteristics of farmlands of owned by respondent
- 2.5 Adoption of SHC based nutrient management practices by Respondent
- 2.6 Impact of soil health card scheme on adoption of nutrient management practice
- 2.7 Constraints Associated with Adoption and Suggestions from respondent to Improve Adoption Rate of SHC based Nutrient Recommendations

2.1 Socio-personal characteristics of the Soil Health Card respondent

2.1.1 Age

Sinha and Sinha (1980) Farmers under the age of 35 were found to practice the majority of adoption (53.70%) and non adoption (27.0 %).

Gajbhaiy (1982) In the backward village, it was shown that there was no direct connection between farmer age and adoption level.

Choudhary *et al.*, (2001) There was no significant link between age and the use of enhanced rice technology, according to the study.

Kushwaha (2005) According to the research, the majority of farmers (55.00%) were of middle age, 19.17 percent were old, and 25.83 percent were of young age.

Singh *et al.*, (2007) In both farmer profiles, the majority of the farmers were in the medium age category (30-50 years).

Shori (2011) According to the results, the great majority of the respondents (68.75%) were in the medium age group (35 to 55 years), 13.75 percent were in the young age group (below 35 years), and 17.50 percent were in the elderly age group (more than 55 percent). As a result, it is reasonable to assume that the majority of rice producers were in their forties and fifties (35 to 55 year).

Sathish (2010) reported that the majority (60.83%) of respondents belonged to middle age group followed by old and young age group.

Kiran and Shenoy (2010) revealed that majority of the respondents belonged to middle age group (53%).

Kumar and Rathod (2013) conducted study on adoption behavior of farmers about recommended technology of soybean and observed that few respondents were distributed in middle (36.00%), young (33.33%) and old (30.67%) age category.

Deshmukh and Deshmukh (2013) indicated that the major portion of responses were in the medium age group (54%) followed by the elderly age category (24.66%) and the young age category (12%). (21.33 percent). Age was not shown to be a major factor in the number of restrictions.

2.1.2 Education

Padekar *et al.*, (2004) The most of the respondents had achieved middle school education (31.23%), followed by 28.13 percent who had completed high school education. Only little more than a quarter of the respondents (25.62%) had completed elementary school, while 8.12 percent and 6.87 percent, respectively, had completed secondary school and were illiterate.

Singh and Varshney (2010) found that education positively correlated with adoption of new rice production technology.

Kumar (2010) The majority of the respondents (28.33%) had only had elementary school education, while 25.00% had only received middle school

education, leaving 16.67% of the respondent's illiterate. Each of the 8.33 percent of respondents had completed at least a high school education and had attended college.

Karki (2010) Farmers' educational levels were substantially different, according to the study, with a P value of 0.005. When compared to non-adopters, SRI adopters were younger and more educated. According to Sathish (2010), a similar percentage of respondents (29.17 percent) completed middle and high school. One-fifth of those polled (20.08 percent) completed primary school and then went on to pre-university education (15.83 percent).

Deshmukh and Deshmukh (2013) The most of respondents (62%) had a middle level education, followed by college level education (24%) and high school level education (2%). Illiteracy and elementary school education were observed in 14% of the population. The number of restrictions was substantially related to education.

Pradhan (2014) It was discovered that 23.61 percent of chosen fragrant rice cultivating farmers had completed high school and 16.67 percent had completed upper secondary education. However, 15.97% of respondents had completed basic education, 9.72 percent had completed college, and just 2.78 percent were illiterate.

2.1.3 Family size

Panday (2000) found that family types were linked to rice production technologies adoption.

Chaudhary *et al.*, (2010) Family size suggest that non but beneficial effect with the adoption of enhanced rice improved varieties, according to the study.

Kumar (2010) The majority of respondents (85.00%) had a medium-sized family (4–15 people), followed by 10% who had a large-sized family (4–15 members) (more than 15 members). The remaining respondents (5.00%) belonged to families with fewer than four people.

Sathish (2010) More over half of the respondents (53.33 percent) said they came from a large family (with more than four people). Agriculture is viewed as a family activity requiring active participation of all family members; as a result, many

respondents may want to live in big families, and many respondents in the research region practice mixed farming (crop-livestock)

Kumar and Rathod (2013) The majority of participants (60.67%) came from a moderate family (four to nine people), while 24.66 percent came from a large family (ten or more people) (ten or more members).

Pradhan (2014) According to the findings, 73.61 percent of respondents had a small family (5 to 8 people), 15.28 percent had a family member (1 to 4 people), and only 11.11 percent had a large family (Above 8 members)

2.1.4 Farming experience in rabi crop

Shrivanand (2007) According to the results, 38.87 percent of the respondents had been growing sugarcane for more than 8 years. About a third of the respondents (32.66 percent) had up to four years of experience. Whereas, 28.67% of respondents had an average of 8 years of sugarcane growing experience.

Tiwari et al. (2007) According to the study, socio-personal characteristics such as education, land holding size, pea producing experience, income, knowledge level, scientific orientation, source of information, extension involvement, and marketing orientation have a significant impact in farmers' adoption behaviour.

Kiran and shenoy (2010) As per the survey, the majority of respondents (44%) had medium household income as well as medium SRI cultivation experience (64 percent).

Narbaria (2013) According to the findings, the majority of respondents (63.49%) had 16 to 30 years of farming experience, followed by 25.40% who had 31 to 45 years of farming experience, 8.73% who had up to 15 years of farming experience, and 2.38 percent who had more than 45 years of farming experience.

Painkra (2014) According to the survey, 44.17 percent of respondents had medium farming experience (11 to 20 years), 37 percent had high farming experience (above 20 years), and 19.17 percent had no black gramme farming experience.

2.2 Socio-economic characteristic's

2.2.1 Occupation

Kulshrestha *et al.*, (2010) found that more than half of respondents had two to three supplementary occupations in addition to farming, had less agricultural assets, had a good attitude toward watershed initiatives, had access to irrigation and credit, had low to average innovativeness in nature, and used medium to low communication sources.

Lakra (2011) Agriculture (hybrid rice cultivation) + employment recorded for 28.76% of the respondents, followed by agriculture (hybrid rice cultivation) 18.75%, hybrid rice cultivation + animal husbandry 18.21 percent, hybrid rice cultivation + business 16.25 percent, agriculture (hybrid rice cultivation) + service 9.37 percent, and hybrid rice cultivation + other 8.75 percent.

Soni (2012) Farming + cauliflower cultivation + labour works (53.12 percent) was the most popular statement, followed by farming + cauliflower cultivation (25 percent), farming + cauliflower cultivation + service (6.25 percent), farming + cauliflower cultivation + others (6.25 percent), farming + cauliflower cultivation + animal husbandry + service (3.13 percent), and growing crops and only cabbage (3.13 percent).

2.2.2 Land holding

Dhruw (2008) stated that the maximum (37.50%) number of respondents had small size of land holding (1 to 2ha).

Patel (2008) stated that most of the respondents (30.66%) had small (1 to 2ha.) sized land holding.

Sathish (2010) The majority of the respondents (50.84) owned medium-sized land, followed by large and small landowners. Farmers in the study region have easy access to irrigation infrastructure such as tube wells, river water, and canals, and when one acre of irrigated land is converted to 2.50 acres of dry land, many would fall into the large landholding group. This may be the situation.

Itawdiya (2011) Out of the total 90 respondents, the majority (30%) had a medium-sized ownership, followed by 27.78%, 22.22 percent, and 20% who had a big, small, or marginal-sized stake, respectively.

Kumar (2011) The majority of the respondents (41.67 percent) had a big land holding (above 4 ha), followed by 25% who had a minor holding (1 to 2 ha), and 17.50% who had a medium land holding (2.1 to 4 ha). Only 15.83 percent of the respondents fell into the marginal group (less than 1ha).

Shori (2011) revealed that maximum number of respondents (31.25%) had medium size of land holding (2.1 to 4.0 ha), followed by 28.76 per cent respondents belonged to small size of land holding (1.0 to 2.0 ha), whereas 23.12 per cent of the respondent were having marginal size of land holding (up to 1.0 ha) however, only 16.87 per cent respondents belonged under large size of land holding category.

Narbaria (2013) indicated that of the total, 53.18 per cent of the selected SRI adopters had 1.1 to 2 ha of holding (small farmer's), followed by 23.01 percent of the respondents had 2.1 to 4 ha of land holding (medium farmer's), 12.70 per cent of the respondents had above 4 ha of land holding (big farmer), while, only 11.11 per cent of the respondents were found as marginal farmer.

Painkra (2014) reported that about 56 per cent respondents were having small land holding (1.1 to 2 ha.), followed by about 32 per cent respondents were medium land holders (2.1 to 4 ha.), 7.51 per cent respondents had marginal land holding (up to 1 ha.) and only 5 per cent of them were comes under large farmer having more than 4 ha land.

2.2.3 Annual income

Sathish (2010) According to the findings, 36.66 percent of respondents were from the high-income group, followed by the medium (31.66 percent), semi-middle (31.66 percent), and low-income groups (4.16%).

Shori (2011) The most of respondents (87.50%) had yearly incomes between Rs.23001 and Rs. 173000, followed by 0.62 percent of 13 respondents who had annual incomes below Rs. 23000, and 11.38 percent of respondents who had annual incomes over Rs. 17300.

Sinha (2012) It was found that 40.62 percent of respondents had annual income between Rs. 50,001 and Rs. 1,00,000, whereas 38.12 percent had annual income less than Rs. 50,000, 12.5 percent had annual income greater than Rs. 1,50,000, and only 8.76 percent had annual income between Rs. 1,00,001 and Rs. 1,50,000.

Dhruw (2014) The majority of the respondents (31.94%) had annual incomes between Rs. 2,00001 and Rs. 4,00000, followed by 26.39 percent who had annual incomes between Rs. 1,00001 and Rs. 2,00000, 22.92 percent who had income up to Rs.1,00000, and only 18.75 percent who had very high family incomes above Rs. 400000.

2.2.4 Soil types

Dhruw (2014) In the kharif rice condition, around 70.45% of the land was covered by kanhar type of soil, 19.39% by matasi type of soil, 9.70% by dorsa type of soil, and just 0.46 percent by bhata type of soil, according to the farmers organization. Only 0.40 percent are, 69 percent kanhar, 19.31 percent matasi, 10.68 percent dorsa, and 69 percent kanhar

Painkra (2014) In the kharif rice condition, around 70.45% of the land was covered by kanhar type of soil, 19.39% by matasi type of soil, 9.70% by dorsa type of soil, and just 0.46 percent by bhata type of soil, according to the farmers organization. Only 0.40 percent are, 69 percent kanhar, 19.31 percent matasi, 10.68 percent dorsa, and 69 percent kanhar.

Pradhan (2014) Vertosols, which are appropriate for rice production, cover 37.56 percent of the research region, according to the findings. Groundnut, maize, urd, bean, and other millets filled around 24.79 percent of the incepti sols area, which is widely utilized for crops. Alfisols occupied 22.63 percent of the land, making it

ideal for rice cultivation in the short and long term. Entisols cover just 15.02 percent of the land, therefore.

Gupta (2015) 65 percent of those polled said they were given leased land with Bhata soil types. Inceptisols and Vartisoil were acquired by 28.47 and 12.5 percent of respondents, respectively, whereas Alfisoil and Bharri type 18 of soils were reported by just 10.4 and 7.0 percent of respondents.

2.3 Socio- psychological characteristics

2.3.1 Cosmopolitaness

Patel (2013) in his study on soil health card holders in Anand districts of Gujarat revealed that overwhelming majority (93.33 per cent) of the respondent had medium level of cosmopolitaness followed by 3.33 per cent, 2 per cent and 01.34 per cent had low, very low and high level of cosmopolitaness, respectively. While none of the respondents had very high level of cosmopolitaness

Babu (2014) conducted a study in East Godavari district of Andhra Pradesh among the paddy farmers and reported that more than half (65 per cent) of paddy farmers belonged to medium cosmopolitaness category, whereas 15 per cent and 20 per cent of the respondents belonged to low and high categories, respectively.

Parveen (2015) reported that less than half (47.5 per cent) of the cotton growers had medium level of cosmopolitaness followed by low (35.84 per cent) and high (16.66 per cent) in a study conducted among the cotton growers of Nalgonda district.

2.3.2 Economic motivation

Patel (2013) in his study on soil health card holders of Anand district of Gujarat found that 73.34 per cent of the farmers had medium level of economic motivation, 20 per cent had a low to very low level of economic motivation and 6.66 per cent farmers had high or very high level of economic motivation.

Pradhan (2014) revealed that 59.03 per cent respondents had medium level of economic motivation, while 32.64 per cent and 8.33 per cent respondents had low and high level of economic motivation, respectively.

Parveen (2015) observed that majority (67.5 per cent) of the cotton growers belonged to high economic motivation followed by medium (26.67) and low (5.83 per cent) respectively in a study conducted among the cotton growers of Nalgonda district.

2.3.3 Innovativeness

Patel (2013) in his study on soil health card holders in Anand district of Gujarat revealed that great majority (85.33 per cent) of the respondents had medium level of innovativeness followed by 8 per cent, 4 per cent and 2 per cent of the respondents had low, very low and high level of innovativeness, respectively.

Babu (2014) conducted a study in East Godavari district of Andhra Pradesh among the paddy farmers and found that majority (66.6 per cent) of the respondents had medium innovativeness followed by high (18.4 per cent) and low (15 per cent) levels of innovativeness

Mahendrasinh (2016) found that majority of the SHC holders had medium (50.83 per cent) to high (20 per cent) level of innovativeness in a study conducted among the in the SHC holders of Navsari district in Gujarat.

Mukati (2016) revealed that out of total soil health card holders he studied in the Tikamgarh district of Madhya Pradesh, hardly 12.82 per cent had high level of innovativeness. Most of the farmers (77.78 per cent) belonged to the group with medium level innovativeness and 9.40 per cent of the soil health.

2.3.4 Information seeking behavior

Yadav et al. (2006) found in a study carried out in the Faridabad district of Haryana that 63 per cent of the farmers studied were depending on government officials of Agricultural Department and Krishi Vigyan Kendra to gain knowledge about soil testing practices whereas 8 per cent of the farmers were not at all beneficiaries of any information sources available to them.

Parveen (2015) in a study conducted among the cotton growers of Nalgonda district found that majority (55 percent) of the respondents belonged to medium category of information seeking behavior followed by high (30.84 percent) and low

(14.16 percent) categories. Most of the respondents frequently contacted information sources. With respect to formal sources majority of the respondents “frequency of contact was either occasional/never. With respect to mass media most of the respondent’s frequency of contact was occasional

Mahendrasinh (2016) revealed that majority (77.50 per cent) of the SHC holders in Navsari district of Gujarat had medium level utilization of information sources. About 7 per cent of the SHC holders reported to be high level information source users and 15 per cent of the respondents had low level information source utilization.

Mukati (2016) in a study conducted among the soil health card holders of Tikamgarh district in Madhya Pradesh found that all the respondents were regular in watching in television whereas 81.20 per cent of the respondents were regular to the use of radio and 18.80 per cent occasionally listen radio for various purposes.

Jacob (2016) conducted a study in Thiruvananthapuram district among the home garden farmers found that 84 per cent of the sampled respondents had high orientation towards mass media/information sources. cards holders had low innovativeness.

2.4.Characteristics of farmlands of owned by respondent

2.4.1. Cropping intensity

Singh (2016) the finding revealed that in the study area, most (66.67%) of the beneficiaries’ farmers had more than 100 percent cropping intensity, while 33.33 per cent of the beneficiaries had up to 100 percent cropping intensity. Whereas, most (86.67%) of the non-beneficiary’s farmers had cropping intensity up to 100 per cent, while 13.33 per cent of the non-beneficiary’s farmers had cropping intensity of more than 100 per cent.

Ahirwar (2017) observed that (70.83%) of the respondents had more than 200 per cent cropping intensity and 29.17 per cent of the respondents had 101 to 200 per cent cropping intensity. None of the respondents had cropping intensity up to 100 per cent.

Markam (2020) illustrated that the cropping intensity before solar pump was 162 per cent after installation of solar pump was 188 per cent while extent of change in cropping intensity was increased 16.04 per cent.

2.4.2 Productivity of major rabi crops

Bordoloi and Das (2017) reported the average grain yield of paddy crop for the farmers applied soil test-based fertilizers as 32.8 q/ha and that of control farmers as 31.55 found in their study conducted in the Jorhat and Golaghat districts of Assam. The average yield of by-product for soil test beneficiary and non-beneficiary farmers were 5.1 q/ha and 4.6 q/ha respectively

2.5. Adoption of Nutrient Management Practices Recommended by the SHC

Mohapatra and Kameshwari (2014) reported that among all the soil management practices being promoted in the study area full adoption of compost was found to be the highest among farmers (42.22 per cent) followed by application of soil amendment (38.88 per cent).

Parveen (2015) observed that majority (62.5 per cent) of the respondents belonged to medium adoption category followed by low (21.67 per cent) and high (15.83 per cent) adoption categories respectively in a study conducted among the cotton growers of Nalgonda district.

Choudhary and Theodore (2016) reported that among the 100 respondents surveyed, 47 farmers had adopted the SHC recommendations in to, where by they were classified as adopters. It was also observed that majority of the farmers i.e., 53 of them did not follow the SHC recommendations, whereas they had followed their own dosages. Among them, it was observed that a vast majority had applied excess quantity of inputs

2.6. Constraints Associated with Adoption and Suggestions from Farmers to Improve Adoption Rate of SHC based Nutrient Recommendations

Patel (2013) in a study conducted among the soil health card users in Anand district Gujarat found that major constraints faced by the farmer were unavailability of micronutrient status of soil ranked first with mean score (78.00

per cent), followed by difficulty in calculating fertilizer dose on the basis of nutrient status of soil (77.33 per cent), unable to operate internet (76.66 per cent), received soil health cards after crop harvest (74.66), time gap between soil samples taken and issuing cards is too high (74.00 per cent), unavailability of internet facility (73.33 per cent), collection of soil samples was not done in presence of farmers (64.00) per cent.

He further noted the suggestions of the respondent farmers to improve their adoption of SHC based recommendations. He found that most of the farmers felt that SHC should be issued prior to crop season (73.33 per cent) with crop wise fertilizer recommendation (74.66 per cent), availability of micronutrient status should be displayed (74.00 per cent), farmer should be trained to take soil sample of its own soil (72.66 per cent), soil testing laboratory should be established at taluka level with highly qualified supporting staff (71.33 per cent), internet facility should be provided at village level (70.00 per cent), soil sampling should be done in presence of farmer (66.66 per cent).

Mahendrasinh (2016) conducted a study among the SHC holders in Navsari district of Gujarat found that major constraints faced by the SHC holders about Soil Health Card were difficult to calculate fertilizer dose on the basis of nutrient status of soil followed by time gap between soil samples taken and issuing cards is too high and unavailability of micronutrient status of soil in the SHC. He also found that majority of the farmers suggested to have the provision of crop wise recommendation of fertilizers in soil health card. Farmers also suggested that Soil Health Card should be distributed to the farmers in time and include micronutrient status in SHC.

Mukati (2016) conducted among the soil health card holders of Tikamgarh district in Madhya Pradesh revealed that large majority of the soil health cardholders faced the problem while making the soil health card (76.92 per cent) followed by difficulty in calculating fertilizer dose on the basis of nutrient status of soil (64.10 percent). The respondents also responded that the task of collection of soil sample was not done in presence of farmers (55.56 per cent), time gap between soil sample was not done in presence of farmers (55.56 per cent), time gap between soil sample taken and issuing cards was too high (51.28 per cent)

received soil health cards after crop harvest (40.17 per cent), inability to understand all the information give in the card (25.64 per cent), no subsidy on inputs required by the government for improving the soil quality (20.51 percent), and irregularity of extension services (17.09 per cent), which may restrict them to clear their doubts at the time of need.

CHAPTER-III

MATERIAL AND METHODS

The chapter covers precise method and procedure followed during the course of research work. The blueprint used in carrying out investigation has been outlined in this chapter. The bifurcation of research methodology adopted is given under following heads:

- 3.1 Location of the study area
- 3.2 Sample and Sampling procedure
 - 3.2.1 Selection of blocks
 - 3.2.2 Selection of Villages
 - 3.2.3 Selection of respondents
 - 3.2.4 Development of interview schedule
 - 3.2.5 Collection of data
 - 3.2.6 Statistical Methods
- 3.3 Variables of the study
 - 3.3.1 Independent variables
 - 3.3.2 Dependent variables
- 3.4 Operationalization of independent variables and their measurement
- 3.5 Operationalization of dependent variables and their measurement
- 3.6 Constraints faced by the farmers for use of Soil Health Card and suggestions given by them.
- 3.7 Type of the data obtained from the respondent in view of the objectives of the study.

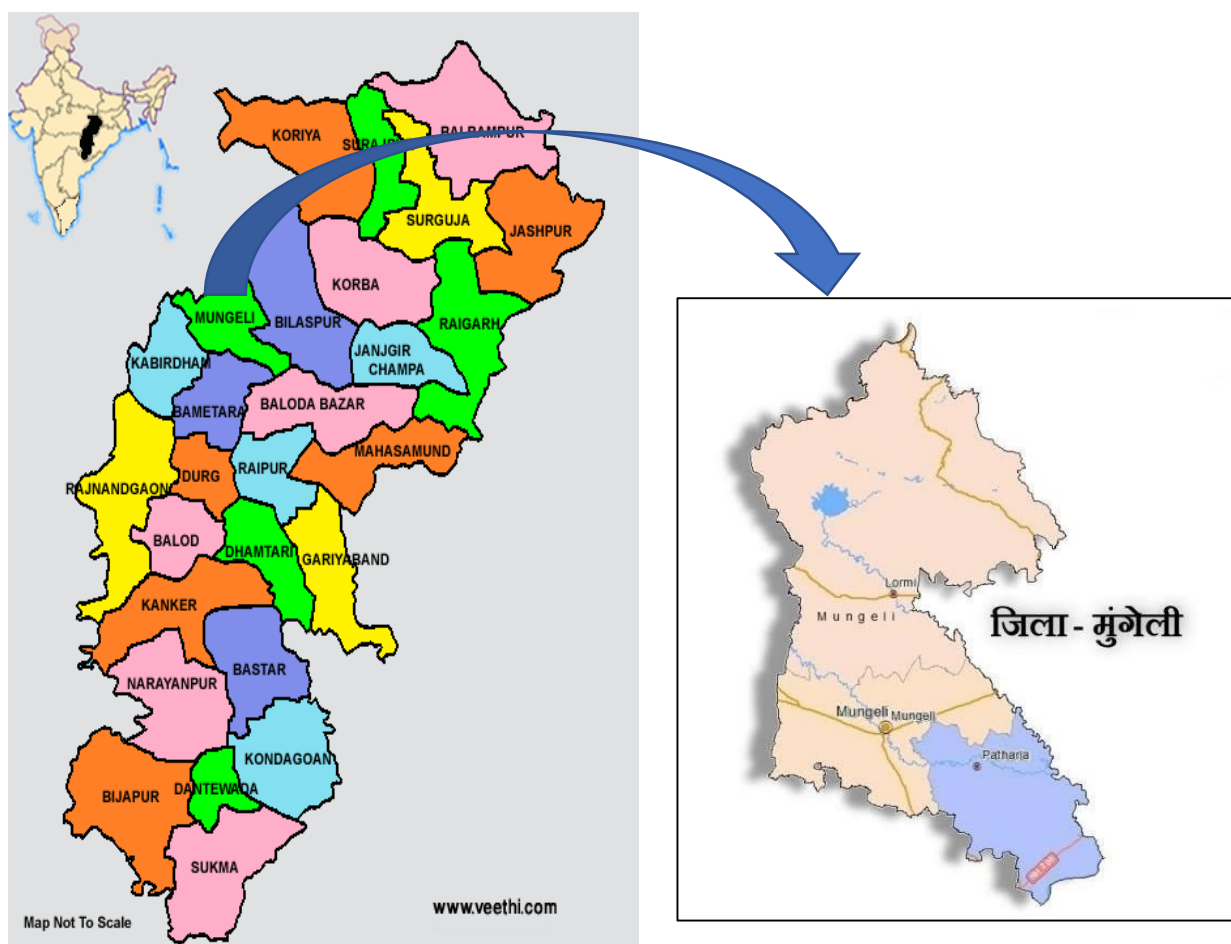
3.1 Location of the study area:

The study was conducted in Mungeli district of Chhattisgarh State of India. Mungeli district is situated between latitude 22 47' and 23 33" north and the longitude 77 21" and 79 49" east. It covers an area of 8,395 square kilometers (3,241 sq mi.). Mungeli comes under Vindhya plateau Argo climatic zone of Chhattisgarh.

3.2 Sample and Sampling Procedure:

3.2.1 Selection of the Study Area

The study was conducted in Mungeli district of Chhattisgarh state during the year 2020 -2021 Chhattisgarh state has 28 districts i.e., Bijapur, Sukma, Dantewada (Dakshin Bastar), Bastar (Jagdalpur), Kondagaon, Narayanpur, Kanker (Uttar Bastar), Kawardha, Rajnandgaon, Balod, Durg, Bemetara, Dhamtari, Gariyaband, Raipur, Baloda Bazar, Mahasamund, Bilaspur, Mungeli, Korba, Janjgir-Champa, Jashpur, Raigarh, Koriya, Surajpur, Surguja (Ambikapur) and Balrampur. A new district Gaurela-Pendra -Marwahi Out of these, Mungeli district was selected purposively for this study.



3.2.2 Selection of district:

The study was conducted during the year 2020-2021 in the Mungeli district of Chhattisgarh state. The Chhattisgarh state consists of 28 districts out of which Mungeli district was selected purposively for the study because maximum area covers SHC in this district

3.2.3 Selection of block:

There are three blocks in Mungeli district, 3 blocks i.e., Mungeli Lormi and Patharia were selected purposively on the basis of area under SHC

3.2.4 Selection of village:

For this study, four villages will be selected randomly from each of the selected block, to make a total of 12 ($4 \times 3 = 12$) Villages will be selected.

Sl.no.	Block	Village	Respondent
1.	Mungeli	Jhitkaniya	10
		Karesara	10
		Navin chamari	10
		Bicharpur	10
2.	Lormi	Lormi rural	10
		Kanteli	10
		Bandhawa	10
		Chakla	10
3.	Patharia	Patharia	10
		Dhardai	10
		Dalpurwa	10
		Sonpuri	10

3.2.5 Selection of respondents:

Ten soil health card holders of soil health card scheme were selected randomly from each village as a respondent. In this way, total 120 [10 x 12 =120] respondent was selected for this study.

3.2.6 Development of interview schedule:

The interview schedule was designed in line with the objectives of the study. The selection of various dependent and independent variables was done based on the information from various government reports, research articles, and discussions with the officials of agencies responsible for SHC generation and distribution in the state as well as in the country. Each question/statement of the schedule was thorough examined and discussed with the experts before finalizing the interview schedule. Adequate precautions and care were taken while formulating the questions to make it easy to understand for the respondents.

3.2.7 Collection of data:

Both primary and secondary data were collected for the study. Primary data collected through personal interview of respondents using a semi structured interview schedule developed for the purpose. Secondary data collected from various reports and government websites. The data were collected by personal interview with the help of well-prepared, structured and pre-tested interview schedule.

3.2.8 Statistical methods:

Collected data were processed, tabulated and analyzed by using appropriate statistical scales and methods like frequency, mean, percentage, correlation coefficient

3.3 Variables of the study:

3.3.1 Independent variables:

Age, Education, Family size, Occupation, Land holding, Annual Income, Soil type, Cosmopolitaness, Economic motivation, Innovativeness, Information

seeking behaviour, Farming experience of rabi crops, use of nutrients, cropping intensity, and Crop productivity of major rabi crops.

3.3.2 Dependent variables:

Impact of soil health card scheme on adoption of nutrient management practices.

3.4 Operationalization of Independent Variables and their Measurement

3.4.1 Age

Age referred to the number of calendar years completed by the respondent farmer at the time of interview. The scoring pattern used to measure age is given below:

Sl. No.	Category	Score
1	Young (up to 35 year)	1
2	Middle (36-55 Year)	2
3	Old (> 55 Year)	3

3.4.2 Education

It is the number of years of formal education acquired by the respondents. The Scale developed by Supe (2007) was used to measure this variable, with some modification.

Sl. No.	Category	Score
1	Illiterate	1
2	Primary (Up to 5 th Class)	2
3	Middle (6th to 8th)	3
4	H. school/ Higher secondary (9th to 12th class)	4
5	College	5

3.4.3 Family size

On the basis of number of members in the family of the respondents the following categories were made and Pradhan (2014) measured this variable in the following manner.

Sl. No.	Category	Score
1	Small (< 4 members)	1
2	Medium (5 to 8 members)	2
3	Large (>8 members)	3

3.4.4 Farming experience

The experiences of respondents were categorized on the basis of years spent in the farmer's crop cultivation. This variable is measured with the help of procedure followed by Painkra (2014). The respondents were categorized as follows:

Sl. No.	Category	Score
1	Less experienced (up to 10 years)	1
2	Medium experienced (11 to 20 years)	2
3	High experienced (Above 20 years)	3

3.4.5 Occupation

This referred to major activity of the respondent in which he/she involved during most part of the day to generate income. Respondents were categorized to different groups as follows:

Sl.no.	Category	Score
1	Agriculture	1
2	Agriculture + Business	2
3	Agriculture + Labour	3
4	Agriculture + Service	4
5	Agriculture + Other	5

3.4.6 Land holding

It referred to the total land owned by the farmer at the time of personal interview. Respondents were grouped under 5 categories using the scale developed by Marked (1996).

Sl. No.	Category	Score
1	Marginal	Up to 1.00
2	Small	1.01 to 2.00
3	Semi-medium	2.01 to 4.00
4	Medium	4.01 to 10.00
5	Big	10.01 and above

3.4.7 Annual income

This referred to the total annual income incurred by the respondent and his/her family members through various activities. Based on family income respondents were grouped under the following categories.

Sl. No	Category	Score
1	< Rs. 100000	1
2	Rs. 100000-250000	2
3	Rs.250000-500000	3
4	> Rs. 500000	4

3.4.8 Soil type:

It is the soil type of farmer's land. According to the depth and topography soils are mainly classified as Bhata (Entisols), Matasi (Inceptisols), Dorsa (Alfisols) and Kanhar (Vertisols) was categorized as under: -Actual soil type of that was considered for analysis purpose as per following pattern.

Sl.no	Category	Score
1	Bhata (Entisols)	1
2	Matasi (Inceptisols)	2
3	Dorsa (Alfisols)	3
4	Kanhar (Vertisols)	4

3.4.9 Cosmopolitaness:

Cosmopolitaness is the tendency of an individual to be in contact with outside of his own community based on the belief that all the needs of an individual cannot be satisfied within his own community.

To measure Cosmopolitaness of respondents, they were asked to indicate their extent of contact with outside to their social system by their own efforts. The procedure followed by Ravishankar (1979) was used in quantification this variable with slight modification. The respondents were grouped in to four categories as following manners:

Sl. No	Category	Score
1	Nil (Never)	0
2	Low (Once in a month)	1
3	Medium (Once in a week)	2
4	High (Twice or more in a week)	3

3.4.10 Economic motivation:

It is defined as the occupational success in terms of profits of maximization and the relative value placed by a farmer on economic ends.

This variable is measured with the help of scale developed by Supe (2007). This scale considered following six items. First five statements are positive and statement number six is negative. The responses are to be recorded on five-point

continuum ranging from strongly agree to strongly disagree. The scoring procedure used is as follows.

Particulars	Response				
	SA	A	UD	DA	SDA
1 Score for positive statement	5	4	3	2	1
2 Score for negative statement	1	2	3	4	5

Considering the economic orientation score of the respondents, they can be grouped into three categories namely 'low', 'medium' and 'high' by using mean and standard deviation.

Sl. No	Category	Score
1	Low	Below Mean – S. D
2	Medium	Between Mean \pm S.D.
3	High	Above Mean + S.D.

3.4.11 Innovativeness:

Innovativeness is a psychological trait, in which a person always seeks out for new ideas. It is operationally defined as proneness of the respondent towards a new agricultural technology or knowledge in order to increase his/her income. The scale developed by Patel (2013) modified and used to measure this variable. The scale consisted of 12 statements including 10 positive and 2 negative statements. Responses were rated on a 3-point continuum i.e., agree, disagree and neutral with 2, 1, and 0 score respectively for positive statement and a reverse scoring for the negative statement. After summing the score of all the respondents, following categories were made using on the basis of mean S.D method:

Sl. No	Category	Score
1	Low	Below Mean – S. D
2	Medium	Between Mean \pm S.D.
3	High	Above Mean + S.D.

3.4.12 Information seeking behavior:

It referred to the frequency of contact or exposure of the respondent farmers to different information sources for obtaining information related to agriculture. This variable was measured using the procedure followed by Bhairamkar (2009). A list of all possible information sources was made and each respondent was asked to indicate how frequently he/she used each source to get agricultural information. The scoring procedure used was 2 for regular, 1 for “occasional” and for never consulting the source. Based on the mean value of total score, respondents were categorized into three categories viz., low, medium and high.

Sl. No.	Category	Score
1	Low	<mean-SD
2	Medium	mean ± SD
3	High	>mean + SD

3.4.13 Cropping intensity:

“Cropping intensity is the ratio between total cropped area and net cultivated area expressed in percentage”.

$$\text{Cropping intensity} = \frac{\text{Total Cropped area in one-year}}{\text{Net cultivated area}} \times 100$$

The respondents were grouped into the following category on the basis of their cropping intensity:

Sl. No.	Category	Score
1	Up to 100%	1
2	101 to 200%	2
3	More than 200%	3

3.4.14 Use of micro nutrients Zink

Use of nutrients is measured in kg per acre. Different dose of nutrients is asked for rabi crops in kg per acre. The dose of each nutrient distributed in various groups by using arbitrary method of classification

Sl. No.	Category	Score
1	Wheat	
	Applied	1
	Not applied	0
2	Chickpea	
	Applied	1
	Not applied	0

3.4.15 Crop Productivity:

It is the average yield obtained from different crops on a farm. The responses from each farmer of crop productivity of major crops were recorded and were depicted on average basis. The crop productivity can be calculated as follows:

$$\text{Crop productivity (q/ha)} = \frac{\text{Total yield (q)}}{\text{Total area (ha)}}$$

3.5 Operationalization of dependent variables and its measurement

Adoption means that a person dose something differently than what they had previously. Recommended dose of various nutrients are noted from their soil health card and their actual dose was also noted. Then the respondents are categorized in to various nutrients on the basis recommended dose and applied dose by the

respondents. Also, the application dose in kg/ha of recommended nutrients was also calculated and presented with standard deviation.

By considering the above the calculations, recommended dose percentage was calculated and on the basis of the calculations average recommended dose was calculated.

Sl. No.	Recommended Practice	Adoption score
		Recommended dose (1). Below Re. dose (0)
1	Application of Urea	
2	Application of DAP	
3	Application of MOP	
4	Application of Zink	
5	Application of FYM	
6	Application of Rhizobium	
7	Application of Vermicompost	

$$\text{Recommendations of dose \%} = \frac{\text{Applied score}}{\text{Total no. of respondent}} \times 100$$

3.6 Constraints faced by the respondents for use of Soil Health Card and suggestions given by them

For the present investigation, the constraints referred to different hurdles faced by the respondents in adopting the soil health card based nutrient management practices. Open ended questions were used to enlist various constraints and grouped under seven categories based on the similarities. Similarly, suggestions were taken from the respondents and open-ended questions were asked to them. After that the suggestions were grouped under nine categories based on the similarities

3.7 Following type of the data were obtained from the respondent in view of the objectives of the study

1. Data regarding socio-personals socio -economic, socio- psychological, and Characteristics of the farm lands owned by farmers of the respondents
2. Data regarding the adoption of nutrient management practices recommended by the Soil health card by the beneficiary respondents.
3. Data regarding the constraints and suggestions associated with the use of Soil health card by beneficiary respondents.

CHAPTER – IV

RESULTS AND DISCUSSION

The purpose of this chapter is to show the results of various variables which being measured in agreement with the study's goals and studied using appropriate statistical methods in a systematic way. The study's main findings are also connected to pervious research findings on related subjects The chapter is presented in the following headings and sub headings.

- 4.1 Independent variables
 - 4.1.1 Socio-personal profile of the soil health card respondent
 - 4.1.2 Socio-economic profile of the SHC respondent
 - 4.1.3 Socio- psychological attributes of respondents
 - 4.1.4 Characteristics of the farm lands owned by respondents
- 4.2 Dependent variables
- 4.3 Correlation analysis of independent variables with dependent variables
- 4.4 Constraints associated with the use of SHC
- 4.5 Suggestions given by the beneficiary respondent

4.1 Socio-personal characteristics of the soil health card respondent.

The 4.1 Socio-personal characteristics of soil health card respondent has been examined and presented as below.

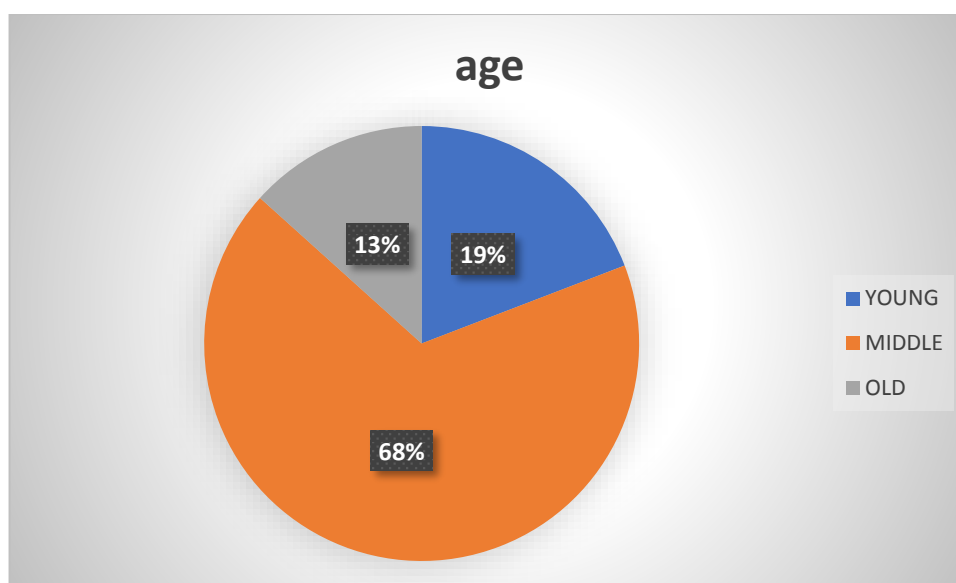
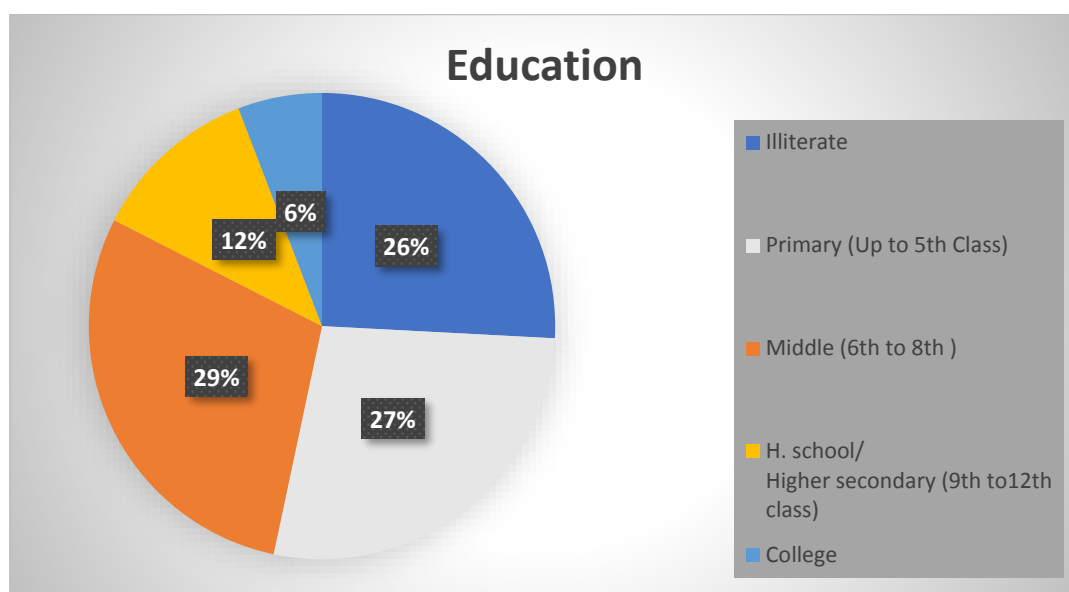
4.1.1 Age

Table 4.1 summaries the data about the respondents' ages. According to the data, the majority of the respondents (67.50%) were in the middle age group (36 to 55 years), 19.17 percent were in the young age group (under 35 years), and just 13.33 percent were in the old age group (above 65 years). belonged to old age group (Above 55 years). The findings indicated that the majority of the farmers in the study area belonged to the middle age groups,

Table 4.1: Distribution of respondents on the basis of their age

(n=120)

S. No.	Category	Frequency	Percentage
1.	Young (Up to 35 years)	23	19.17
2.	Middle (36 to 55 years)	81	67.50
3.	Old (More than 55 years)	16	13.33

**Fig. 4.1: Distribution of respondents on the basis of their age****Fig. 4.2: Distribution of respondents on the basis of their education**

These findings are similar to findings Kushwaha (2005). Similar results were also reported by Gaurav (2000), Ganesh Rashad (2010), Chouhan (2013) and Rathod (2018), Patel (2013) and Mukati (2016).

4.1.2 Education

Table 4.2 shows that 29.17 and 27.50 percent of the farmers were educated from middle through Primary school. Only 25.83 percent of respondents were illiterate followed by 11.67 percent graduated high school or higher secondary school, and only 5.33 percent had completed college.

Table 4.2: Distribution of respondents on the basis of education

(n=120)

S. No.	Category	Frequency	Percentage
1.	Illiterate	31	25.83
2.	Primary (Up to 5th class)	33	27.50
3.	Middle (6th to 8th class)	35	29.17
4.	H. school /Higher secondary (9 th to 12 th class)	14	11.67
5.	College level	07	5.83

Similar results were also reported by Mukati (2016) and Mahendrasinh (2017). Kumar (2010) reported that 27.50 per cent of respondents were educated up to primary school level and 29.17 per cent had education up to middle school level, followed by 25.83 per cent of the respondents who were illiterate.

4.1.3 Family size

The data regarding family size Table 4.3 indicated that, 60.00 per cent of the respondents were having medium size of family (5 to 8 members), followed by 24.17 per cent respondents had small family size (up to 4 members) and only 15.38 per cent of the respondents belonged to large size of family (above 8 members).

Table 4.3: Distribution of respondents on the basis of family size

(n=120)

S. No.	Category	Frequency	Percentage
1.	Small (< 4 members)	29	24.17
2.	Medium (5 to 8 members)	72	60.00
3.	Large (>8 members)	19	15.38

These findings are similar as reported by Kumar and Rathod (2013) result was also reported Digambar (2016) that most of the respondents (60.67%) were observed in medium size of family.

4.1.4 Farming experience

In terms of agricultural experience, Table 4.4 reveals that 65.33% of respondents had extensive farming experience (above 20 years), 30. percent had medium farming experience (11 to 20 years), and 6.67 percent had limited farming experience.

Table 4.4: Distribution of respondents on the basis of farming experience

(n=120)

S. No.	Category	Frequency	Percentage
1.	Low experience (Up to 10 Years)	08	6.67
2.	Medium experience (11 to 20 Year)	36	30.00
3.	High experience (more than 20 years)	76	65.33

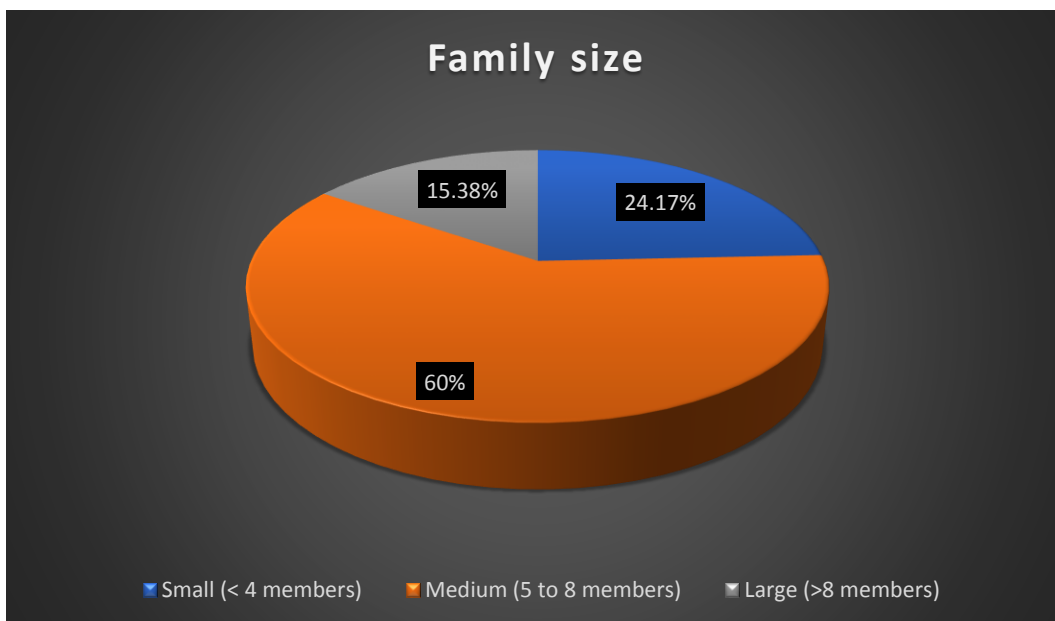


Fig. 4.3 Distribution of respondents on the basis of family size

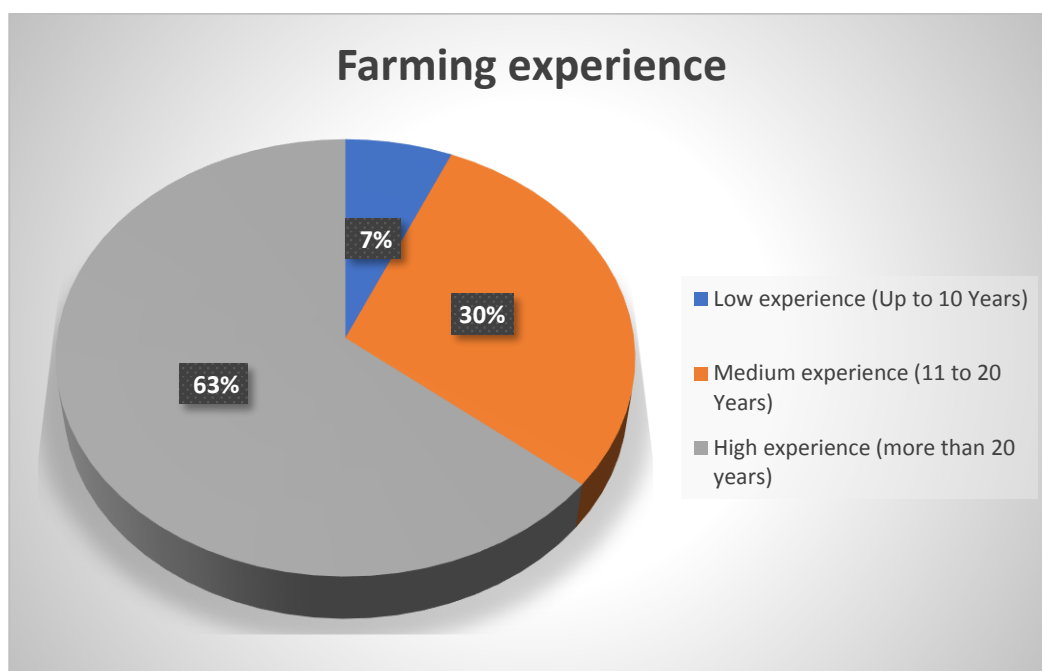


Fig. 4.4 Distribution of respondents on the basis of farming experience

Painkra (2014) reported that 44.17 per cent of respondents had medium farming experience (11 to 20 years), about 37 per cent respondents had high farming experience (Above 20 years) and 19.17 per cent respondents had low farming experience of black gram cultivation.

4.2 Socio -economic profile of the SHC respondent

4.2.1 Occupation

The results on occupation of the respondents (Table: 4.5) shows that main occupation of majority of the SHC respondent (80%) was agriculture whereas. A few respondents involved in agriculture + service (4%) and agriculture + other (2.5%). a few respondents (10%) were doing agriculture+ labour. The result shows that majority of the respondents were depending mainly on agriculture for their livelihood. The above findings are supported by Mahendra Singh (2017) and Painkra (2014).

Table 4.5: Distribution of respondents on the basis of occupation

(n=120)

S. No.	occupation	Frequency	Percentage
1.	Agriculture	96	80.00
2.	Agriculture +Business	04	3.33
3.	Agriculture + Labour	12	10.00
4.	Agriculture + Service	05	4.17
5.	Agriculture + Other	03	2.5

The above findings are supported by Mahendra Singh (2017) and Painkra (2014).

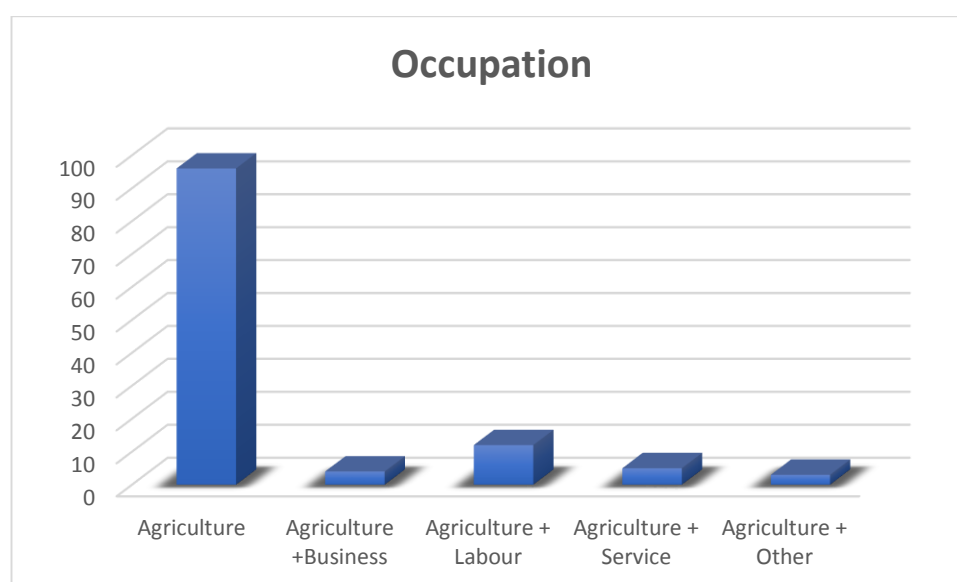


Fig. 4.5 Distribution of respondents on the basis of occupation

4.2.2 Land holding

Table 4.6 reveals that the maximum 59.17 per cent respondents were marginal farmers followed by small farmers (31.67%), medium farmers (6.67%), and only (2.5%) was found above 4 ha of land holding (big farmers). It can be concluded from the data that majority of the respondents had up to 1 ha of land holding (marginal farmers).

Table 4.6: Distribution of respondents on the basis of land holding

(n=120)

S. No.	Category	Frequency	Percentage
1.	Marginal (up to 1 ha)	78	59.17
2.	Small (1.1-2 ha)	38	31.67
3.	Medium (2.1- 4 ha)	08	6.67
4.	Large (>above 4 ha)	03	2.5

Similar finding was reported by Singh et al. (2012).

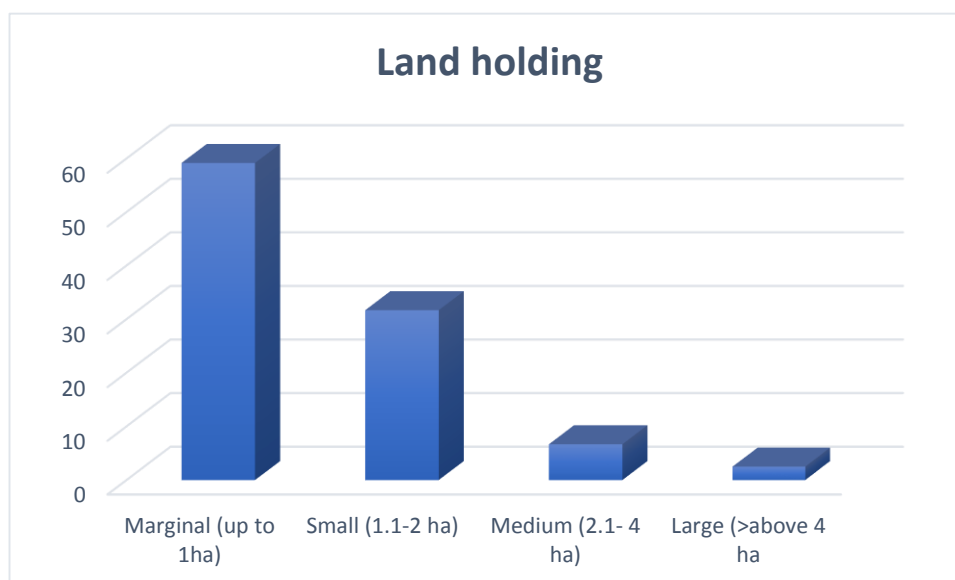


Fig. 4.6 Distribution of respondents on the basis of land holding

4.2.3 Annual income

The result of the income analysis (Table: 4.7) shows that majority of SHC respondents (67.50%) belonged to Rs. 100000-250000 income group followed by Rs. 250000-500000(12.50%) group, followed by <Rs. 100000 group (11.67%) and a few SHC respondents belonged to income Rs. >500000 (8.33%)

Table 4.7: Distribution of respondents on the basis of annual income

(n=120)

S. No.	Category	Frequency	Percentage
1.	<Rs. 100000	14	11.67
2.	Rs. 100000-250000	81	67.50
3.	Rs. 250000-500000	15	12.50
4.	>Rs. 500000	10	8.33

It can be concluded majority of the respondents had Rs. 100000 to 250000 annual incomes from data that the findings are supported by Mukati (2016).

4.2.4 Soil type

The common classification of land in the study area is done according to land situation and broadly divided into Bhata, Matasi, Dorsa and Kanhar. This classification is also scientifically based on soil topography and depth and these terms are used by Pedologists known as Entisols, Inceptisols, Alfisols and Vertisols, respectively.

Table 4.8: Distribution of respondents on the basis of Soil type

(n=120)

S. No.	Category	Frequency	Percentage
1.	Entisols (Bhata)	11	9.17
2.	Inceptisols (Matasi)	04	3.33
3.	Alfisols (Dorsa)	10	8.33
4.	Vertisols (Kanhar)	95	79.17

*Data are based on multiple responses

The data presented in Table 4.8 reveals that out of total, 79.17 per cent of the respondents were occupied Vertisols type of land, followed by 3.33 per cent respondents Inceptisols and 8.33 per cent respondents Alfisols. About 9.17 per cent

of them occupied Entisols type of land. A close observation of the above data clearly indicates that the majority of the beneficiaries were having Vertisols types of land. This result corroborates with the findings of Dhruw (2014) and also Singh (2018)

Fig. 4.7: Distribution of respondents on the basis of to annual income

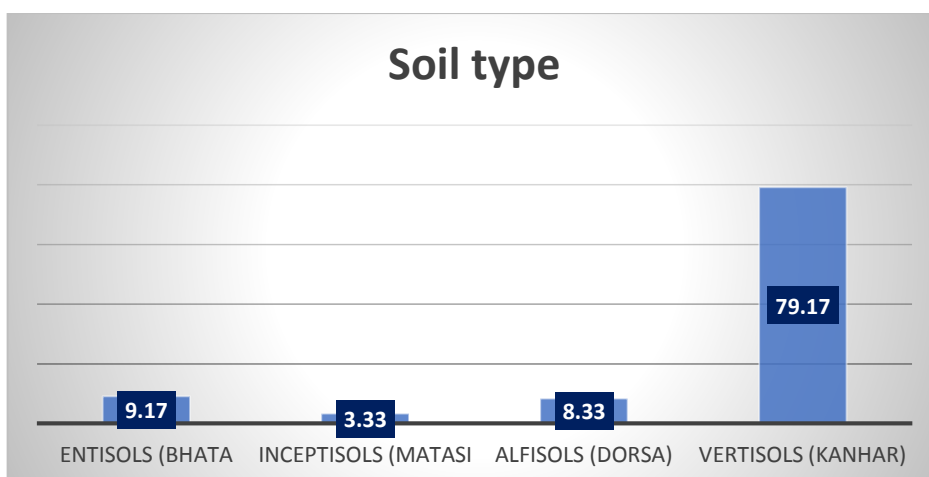
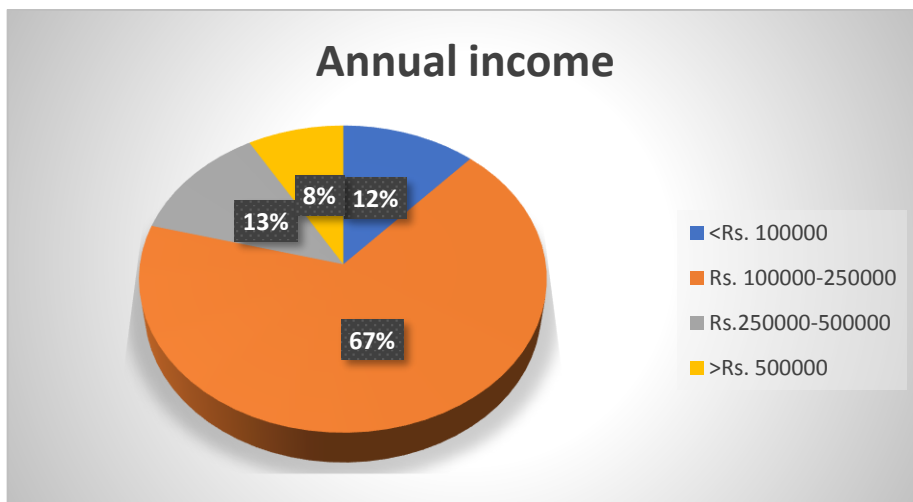


Fig. 4.8: Distribution of respondents on the basis of soil type

4.3 Socio- psychological attributes of farmers

4.3.1 Cosmopolitaness

The data regarding cosmopolitaness are presented in Table 4.9. The results show that majority of the respondents (85.83%) had low cosmopolitaness, followed by 5.83 per cent of them had nil and medium 5% cosmopolitaness and only 3.33 per cent of them had high cosmopolitaness. Yadav (2010) also found similar findings in his study.

Table 4.9: Distribution of respondents on the basis of cosmopolitaness

(n=120)

S. No.	Category	Frequency	Percentage
1.	Nil (Never)	07	5.83
2.	Low (Once in a month)	103	85.83
3.	Medium (Once in a week)	06	5.00
4.	High (Twice or more in a week)	04	3.33

4.3.2 Economic motivation

The data presented in Table 4.10 and Fig. 4.9 were subjected to percentage distribution of the respondents according to their economic motivation. The data indicates that majority of the respondents (65.00%) had medium level of economic motivation, while 20.83 per cent had low and 14.17 per cent had high level of economic motivation.

Table 4.10: Distribution of respondents on the basis of economic motivation

(n=120)

S. No.	Category	Frequency	Percentage
1.	Low	25	20.83
2.	Medium	78	65.00
3.	High	17	14.17

Mean 11.69 SD 3.46

This may be due to the reason that the respondents were still not thinking agriculture as a business and the irregular climatic and marketing factors made them not to think about rainfall profits. Moreover, the uncertainty level in the respondents was increasing day-by-day because of these factors. Hence, such trend was noticed.

This is in conformity with the results by Jha (2012), Kumari and Laxmi Kant (2015) and Salunkhe *et al.* (2012)

Fig. 4.9: Distribution of respondents on the basis of economic motivation

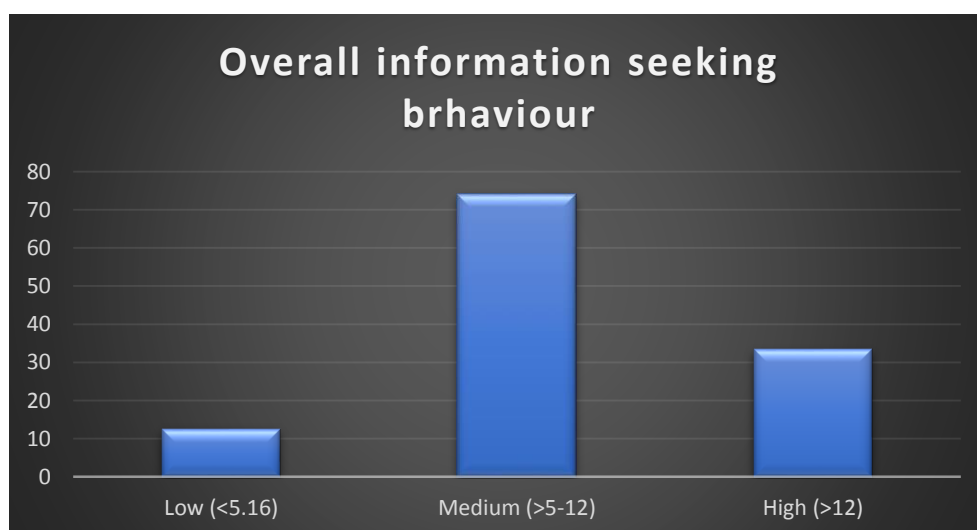
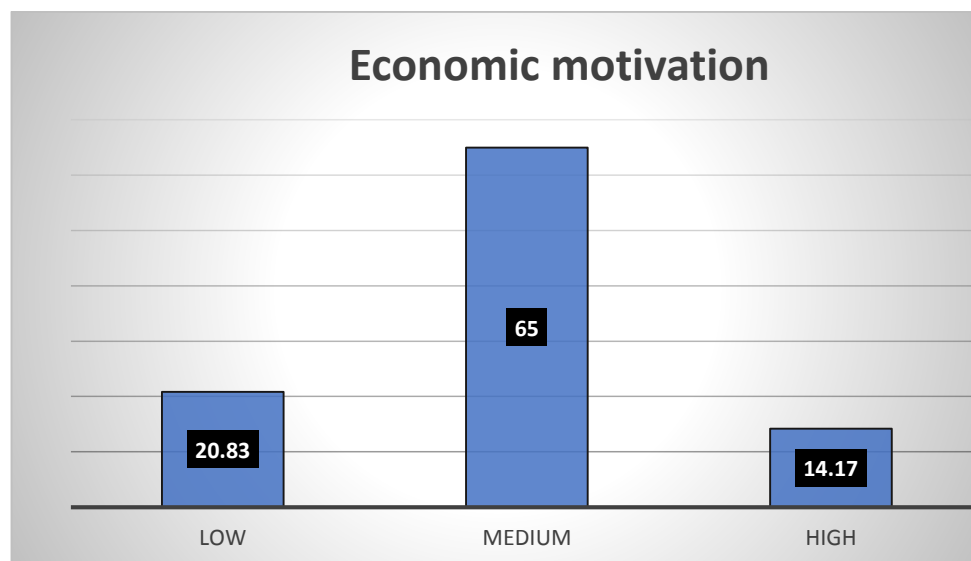


Fig. 4.10: Distribution of respondents on the basis of overall information seeking behavior

4.3.3 Innovativeness

The result of the analysis of innovativeness for SHC respondents (Table: 4.11) shows that most of the beneficiaries (65.00%) were belonging to the medium innovativeness, followed by low innovativeness (9.17%), high innovativeness (25.83%), The above results are in accordance with Mukati (2016) and Dubey (2018)

Table 4.11: Distribution of respondents according to their innovativeness

(n=120)

S. No.	Category	Frequency	Percentage
1.	Low (<27)	11	9.17
2.	Medium (27-30)	78	65.00
3.	High (>30)	31	25.83
Mean 28.68			SD 1.74

4.3.4 Information seeking behavior

The information sources are the means of seeking new information, knowledge and guidance about any particular production technology. The source of information not only gives knowledge about the new production technology but also familiarize the farmer with the information as well. The distribution of respondents according to the degree of usage of information sources as seen in Table 4.12.

The data in table furnished that 74.16 percent of the respondents had “medium level” of exposure to various source of information for getting knowledge about soil health card scheme, followed by 12.5 per cent of the respondents had “low level” of exposure to various information sources and only 33.33 per cent of the respondents were found to have “high level” use of information sources.

Table 4.12: Distribution of the respondents according to their overall information seeking behavior

(n=120)

S. No.	Category	Frequency	Percentage
1.	Low (<5)	15	12.5
2.	Medium (>5-12)	89	74.16
3.	High (>12)	16	33.33
Mean 8.68			SD 3.52

Table 4.13: Distribution of respondents on the basis of use of Information seeking behavior

(n=120)

S. No.	Sources of information	Regular	occasional	Never
1.	Neighbor	11 (9.71)	84 (70.00)	25 (20.83)
2.	Relatives	14 (11.67)	75 (62.50)	31 (25.83)
3.	Progressive farmers	07 (5.83)	26 (21.67)	87 (72.50)
4.	Local leader	12 (10.00)	38 (31.67)	70 (58.33)
5.	RAEO	04 (3.33)	62 (51.67)	54 (45.00)
6.	ADA	03	23	94

		(2.05)	(19.17)	(78.33)
7.	SMS	02	12	106
		(1.67)	(10.00)	(88.33)
8.	KVK	79	36	05
		(65.83)	(30.00)	(4.17)
9.	Magazines	09	12	99
		(7.50)	(10.00)	(82.50)
10.	Television	42	50	28
		(35.00)	(41.67)	(23.33)
11.	KCC	03	19	98
		(2.50)	(15.83)	(81.67)
12.	Internet	11	26	83
		(9.17)	(21.67)	(69.17)
13.	Group discussions	12	87	21
		(10.00)	(72.50)	(17.50)
14.	Kishan mela	5	64	51
		(4.17)	(53.33)	(42.50)

Only 10.00 per cent of the respondents attended Group discussion and magazines, 7.50 percent, 1.67 per cent and 2.50 per cent of the respondents contacted SMS, relatives and kisan call center respectively for getting information about soil health card scheme.

Whereas, the majority (51.67 per cent) of the respondents had occasional contacted with Agricultural department or RAEO, followed by 21.67 percent of the respondents had contacted with progressive farmer, 31.67 per cent of the respondents contacted with local leader and neighbors, 70.00 percent of the respondents occasional get information through relatives ,19.17 per cent of the

respondents were contacted ADA, 41.67 per cent of the respondents watch television for getting information occasional, 30.00 per cent of the respondents contacted KVK, 10.00 per cent of the respondents occasional contacted SMS, 10.00 percent of the respondents occasional get information through magazines , 21.67 per cent of the respondents get information through Internet, 72.50 per cent of the respondents get information through group discussions, 53.33 per cent of the respondents occasional get information through Kishan Mela to get information.

Majority of the respondents (88.33 per cent) of the respondents never attained farmers visit SMS for getting information, followed by 69.17 per cent of the respondents never use internet for getting information, 17.50 of the respondents never attained /group discussion, and 42.50 per cent of the respondent never visit Kishan Mela 4.17 per cent of the respondents never get information through KVK never visit, 82.50 per cent of the respondent never reading magazines

25.83 per cent of the respondents never get information through relatives, 23.33 per cent of the respondents never watch television for getting information, 58.33 per cent of the respondent never get information through local leader, 72.50 per cent of the respondents never get information through progressive farmers, 31.67 per cent of the respondent never get information through neighbors, only 45.00 and 78.33. per cent of the respondents never get information through agriculture department/RAEO and ADA.

4.4 Characteristics of the farm lands owned by farmers

4.4.1 Use of micro nutrients Zink

The findings of the Table 4.14 reveal that 75.00 per cent of the majority of the respondent had use applied micro nutrients in Zink in wheat crops and 25.00% respondents not applied for Zink in own field

Similarly, in case of Chickpea respondent 91.67% per cent respondents had use applied Zink nutrients in Chickpea crop and 8.33% respondent not applied for Zink nutrients in own field

Table 4.14: Distribution of respondents on the basis of use of micro nutrients Zink
(n=120)

S. No.	Major crops	Applied	Not applied
	Category	frequency	percent
1.	Wheat	90	75
2.	Chickpea	110	91.67

4.4.2 Cropping intensity

The findings regarding cropping intensity are compiled and presented in Table 4.15. It was observed that (76.67%) of the respondents had more than 200 per cent cropping intensity and 23.33 per cent of the respondents had 101 to 200 per cent cropping intensity. None of the respondents had cropping intensity up to 100 per cent. It is clear from the data that respondents were growing more than 2 to 3 crops in the field may be due to assured irrigation facility or other production facility and the average cropping intensity of the respondents was found to be 200.46 per cent.

Table 4.15: Distribution of respondents according to their cropping intensity (CI)

S. No.	Category	Frequency	Percentage
1	Up to 100%	00	00.00
2	101 to 200%	28	23.33
3	More than 200%	92	76.67

Average CI= 200.46%

4.1.14 Productivity

The result of Table 4.17 shows, the area production and productivity of wheat and Chickpea among the respondents. In the study area all the respondents had cultivated wheat and Chickpea.

The data revealed that total average area under wheat was 9.456 ha. and in case of Chickpea, total average area was only 14.05 ha. The total average productivity of wheat crops and Chickpea was 12.07 q/ha. and 19.04 q/ha. respectively.

Table 4.16: Average Area, and Average productivity of wheat and Chickpea
(n=120)

S. No.	Particular	Total average area (ha)	Average productivity (q/ha)
1.	Wheat	9.456	12.07
2.	Chickpea	14.05	19.04

4.2 Impact of soil health card scheme on adoption of nutrients management practices.

The adoption process is the mental process through which an individual pass from first hearing of an innovation to its final adoption. adoption is a decision to continue full use of an innovation. With a view to find out the level of adoption of SHC based nutrients managements practices in major rabi crops the soil health card respondents were asked to indicate at what application of plant nutrients they adopted recommended practices of SHC based nutrients managements practices the data in this regard are presented in Table 4.17

Data presented in table show that 6 selected practices of recommended SHC based nutrients managements practices and among all the respondents the number of respondents and the different level of adoption categories such as in application of nutrients in wheat crops DAP majority (87.50%) of the respondents had recommended dose adopted followed by application of plants nutrients (FYM) farm yard manure (85.83%) of the respondents had recommended dose adopted and only (66.67%) of respondents had recommended dose Urea and application of plant nutrients followed by (77.50%) of the respondent had recommended dose adopted

Zink and (80.83%) of the respondents had recommended dose of nutrients adopted MOP in wheat crops maximum 33.33% of the respondents had below recommended dose adopted Urea followed by 22.50% of the respondents had below recommended dose adopted Zink and only 19.17% of the respondents had below recommended dose MOP followed by 14.17% of the respondents had below recommended dose adopted FYM (farm yard manure) about (12.50%) of the respondents had below recommended dose adopted DAP

Table 4.18 In case of chickpea crops application of plant nutrients Rhizobium majority (91.67%) of the respondents had recommended dose adopted followed by application of plants nutrients MOP(87.50%) of the respondents had recommended dose adopted and only (69.17%) of respondents had recommended dose adopted DAP Followed by (81.67%) of the respondents had recommended dose adopted Urea and (55.83%) of the respondents had recommended dose adopted Zink in chickpea crop maximum 44.17% of the respondents had below recommended adopted Zink nutrients followed by (30.83%) of the respondent had below recommended dose adopted DAP and only (18.33%) of the respondent had below recommended dose adopted urea followed by (8.33%) of the respondents had below recommended dose adopted rhizobium.

Table 4.17: Distribution of the respondent according to the application of plant nutrients in wheat crops

S. No.	Application of nutrients in wheat crops	Recommended dose		Below recommended	
		frequency	percent	frequency	percent
1.	Urea	80	66.67	40	33.33
2.	DAP	105	87.50	15	12.50
3.	MOP	97	80.83	23	19.17
4.	Zink	93	77.50	27	22.50
5.	FYM/Green manures	103	85.83	17	14.17

Table 4.18: Distribution of the respondent according to the application of plant nutrients in Chickpea crops

S. No.	Application of nutrients in Chickpea crops	Recommended dose		Below recommended dose	
		frequency	percent	frequency	percent
1.	Urea	98	81.67	22	18.33
2.	DAP	83	69.17	37	30.83
3.	MOP	105	87.50	15	12.50
4.	Zink	67	55.83	53	44.17
5.	FYM/Green manures	85	70.83	35	29.17
6.	Rhizobium	110	91.67	10	8.33

Table 4.19: Actual Application of plant nutrients in major rabi crops

S. No.	Application of nutrients in average use	Wheat		Chickpea	
		Application (kg/ha.)	SD	Application (kg/ha.)	SD
1.	Urea	186.59	20.64	58.21	8.94
2.	DAP	116.42	15.78	127.13	10.14
3.	MOP	37.96	4.86	29.86	4.64
4.	Zink	17.54	4.89	11.57	2.29
5.	Rhizobium	00	00	1.18	0.39
	Nutrients	Application (ton/ha.)	SD	Application (ton/ha.)	SD
6.	FYM /green manures	12.23	1.41	4.64	1.50

Table 4.20: Application of recommended and applied dose (%) of plant nutrients in major rabi crops

S. No.	Application of nutrients in average use	Wheat			Chickpea		
		Re	Application (kg/ha.)	DP %	Re	Application (kg/ha.)	DP %
1.	Urea	232.44	188.44	81.37	67.58	58.67	87.17
2.	DAP	125.63	119.38	95.12	140.71	123.11	87.68
3.	MOP	43.37	41.65	96.23	30.89	23.08	75.51
4.	Zinc	21.66	12.61	59.49	17.81	11.56	65.79
5.	Rhizobium	00	00	00	2	0.72	36.25
Overall average				62.44			43.42
Application (kg/ha.)							
S. No.	Nutrients	Wheat			Chickpea		
		Re	Application (ton/ha.)	DP	Re	Application (ton/ha.)	DP
6.	FYM /green manures	11.60	4.43	38.33	10	6.81	65.02

From the Table 4.21, it was observed that there was significant influence of dose of per cent among different plant nutrients. In wheat crop, the difference dose of per cent in different nutrients *viz.* Urea, DAP, MOP, Rhizobium and farm yard manure were 81, 95.12, 96.23, 59.49 and 38.33 %, respectively. Similarly, in chickpea crop, the dose of per cent varied from 87.17, 87.68, 75.51, 65.79, 36.25 and 65.02 %, respectively. Overall, the average dose of per cent for wheat was 62.44 % whereas in chickpea it was 43.42 % on the basis of recommended soil health card nutrient management practices in major rabi crops.

4.3 Correlation analysis of independent variables with dependent variables

4.3.1 Correlation of “Recommended dose of application of plant nutrients adoption of Soil Health Card based nutrient management practices by wheat crops respondents’ with independent variables.

The analysis carried (Spearman's rank correlation) out to test the correlation between independent variables with average application of plant nutrients of recommendation of soil health card by the respondent was given in tables 4.21 out of all six education, annual income, land holding, source of information, soil type, productivity, variables was significance at 0.01 probability level whereas only one variables use of nutrients was significant at 0.05 probability level and eight variables age, family size, farming experience, cosmopolitaness economic motivation, innovativeness cropping intensity was not significant

Table 4.21: Correlation “average application of nutrients” adoption of Soil Health Card based nutrient management practices by wheat crops respondents’ with independent variables

(n=120)

S. No.	Variables	Correlation coefficient
1.	Age	-0.149 ^{NS}
2.	Education	0.256**
3.	Family size	-.168 ^{NS}
4.	Farming experience	0.129 ^{NS}
5.	Occupation	0.106 ^{NS}
6.	Land holding	0.523**
7.	Annual income	0.354**
8.	Soil type	0.178**
9.	Cosmopolitaness	0.103 ^{NS}
10.	Economic motivation	0.043 ^{NS}
11.	Innovativeness	0.134 ^{NS}
12.	Information seeking behaviour	0.312**
13.	Use of nutrients	-0.124*
14.	Cropping intensity	0.015 ^{NS}
15.	Productivity of major rabi wheat	0.253**

* Significant at the 0.05 level of probability

** Significant at the 0.01 level of probability

**NS – not significant

Table 4.22: Correlation, average application of nutrients adoption “ of Soil Health Card based nutrient management practices by chickpea crops respondents’ with independent variables

The analysis carried (Spearman’s rank correlation) out to test the correlation between independent variables with average application of plant nutrients of recommendation of soil health card by the respondent was given in tables 4.22 out of all five education, annual income, land holding, information seeking behavior, productivity, variables was significance at 0.01 probability level whereas only two variables use of nutrients, soil type was significant at 0.05 probability level and eight variables age, family size, farming experience, occupation, cosmopolitaness economic motivation, innovativeness cropping intensity was not significant

(n=120)

S. No.	Variables	Correlation coefficient
1.	Age	-0.139 ^{NS}
2.	Education	0.257**
3.	Family size	-.178 ^{NS}
4.	Farming experience	0.139 ^{NS}
5.	Occupation	0.109 ^{NS}
6.	Land holding	0.524**
7.	Annual income	0.353**
8.	Soil type	0.168*
9.	Cosmopolitaness	0.1041 ^{NS}
10.	Economic motivation	0.043 ^{NS}
11.	Innovativeness	0.136 ^{NS}
12.	Information seeking behavior	0.313**
13.	Use of nutrients	-0.126*
14.	Cropping intensity	0.017 ^{NS}
15.	Productivity of major rabi chickpea	0.253**

*Significant at the 0.05 level of probability

**Significant at the 0.01 level of probability

**NS = non-significant

4.4 Constraints associated with the use of SHC

The analysis carried out to assess various constraints associated with the use of SHC (Table 4.23) shows that most of the respondents (58.33%) were facing without the support of an agricultural/extension agent, it is difficult to comprehend

the information on SHC was I. Another major constraint identified was then lack of knowledge about what is SHC and its use even after receiving the card (29.16% respondents) and it was ranked II. Also, the constraint before a minor group of respondents (20.83%) was unavailability of SHC before crop season rank III. and another minority (10.00%) faced problem was high cost of fertilizers (recommended in SHC) and was ranked VI.

Table 4.23: Distribution of respondents on the basis of constraints

S. No.	Problems	Frequency	Percentage
1.	Without the support of an agricultural/extension agent, it is difficult to comprehend the information on SHC.	70	58.33
2.	The suggested amount of organic manure for farming is not available.	20	16
3.	Lack of trust in the information given in soil health card.	18	15
4.	High cost of fertilizers prize (recommended in SHC.	12	10
5.	Unavailability of SHC before crop season	25	20.83
6.	Lack of knowledge about what is SHC and its use even after receiving the card	35	29.16
7.	Other personal constraints associated with illiteracy/low education	17	14

*Data are based on multiple responses

4.5 Suggestions given by the SHC respondents

The result on analysis of the suggestions (Table: 4.26) shows that majority of them (25.00%) suggested that RAEO/Gramsevaks should come before sowing to interpretate the content/recommendation of SHC and was ranked as I. followed by training should be given on proper method of collecting soil sample (20.83%) and was ranked II, and followed by SHC should be given personally to the farmers and

should made available on time (20.00%) and was ranked III, and was Minority (1.66%) of them also suggested that meth VII.

Table 4.24: Distribution of the respondents' according the suggestions

S. No.	Suggestions	Frequency	Percentage	Rank
1.	Training should be given on proper method of collecting soil sample	25	20.83	II
2.	RAEO"s (Gram sevak) should come before sowing to interpretate the content. /Recommendation of SHC	30	25.00	I
3.	Method of calculating dose on the basis of nutrient status should be given in SHC	20	16.66	IV
4.	Expert from other campus should come to explain the utility of SHC	12	10.00	V
5.	SHC should be given personally to the farmers and should made available on time	24	20.00	III
6.	Contact no. of the scientist and additional information regarding disease management should be given in SHC	7	5.83	VI
7.	Soil analysis should be done in different laboratories	9	7.5	VI
8.	Timing should be specifying for application of fertilizers	8	6.66	VI
9.	Method of fertilizer application should be given	2	1.66	VII

*Data are based on multiple responses

CHAPTER - V

SUMMARY AND CONCLUSIONS

The main intention of this chapter is to summarize the results and to state the conclusions on the basis of the fore going analysis and to indicate some of their conclusions about actions.

Because soil is the foundation and most important ingredient for both the environment and human health, it must be maintained carefully in order to recover its potential to feed our people in a long-term sustainable manner. It is necessary to keep the soil healthy in order to ensure its long-term viability. It is critical to determine the amount of nutrients present and to use just on the 19th of February, 2015, the government introduced a Soil Health Card system to attain the desired goal. A Soil Health Card (SHC) is a printed card supplied to a farmer that provides the status of various plant nutrients available in his or her soil (soil health indicators) as well as the dosage of various fertilizers for the primary crops grown on his or her field based on soil test results. During the Soil health card scheme 106637251 soil health cards has been dispatched to the farmers (Source: soilhealth.dac.gov.in). (Changa) conducted a survey of farmers in the Hisar area and discovered that 55 percent of them had a basic understanding of soil testing procedures. (Reddy) conducted a study across different states on SHC impact and found that many farmers were unable to understand the content of SHC, hence unable to follow the recommended practices. Many studies have been carried out in the concerned subject, but no study has been done in the Mungeli district of Chhattisgarh.

In the state, therefore the following study entitled “**a study on impact of soil health card scheme on nutrients management practices in major rabi crops among the farmers of Mungeli district of Chhattisgarh**”. The following particular objectives are being carried out:

1. To study the profile characteristics of the Soil Health Card holders.
2. To assess the impact of soil health card recommendation on nutrient management for the major rabi crops.

3. To study the relationship between independent and dependent variables.
4. To know the constraints during the use of nutrient management practices and to obtain the suggestions to overcome the constraints.

Methodology

The study was conducted in Mungeli district of Chhattisgarh. Out of 3 blocks, Mungeli, Lormi and Patharia, blocks were purposively selected for the study. From each block four villages were selected randomly from each selected block, so a total of 12 villages ($4 \times 3 = 12$) were selected randomly based on maximum availability of soil health card holders in the villages and in each selected village, 10 SHC respondents (Total $10 \times 12 = 120$) were selected randomly as respondents. Thus, for the research, a total of 120 respondents were selected. Using a well-structured pre-tested interview schedule via personal interview, the information was collected.

The major findings of this study are summarized as follows:

5.1 Independent variable

The independent variable included with this study were age, education, family size, farming experience, occupation, land holding, annual income, soil type, cosmopolitaness, economic motivation, innovativeness, information seeking behavior, use of nutrients, cropping intensity, productivity of major rabi crops. The study's dependent variable was the impact of soil health card scheme on adoption of nutrients management practices, adoption of soil health card based nutrients, average application of plant nutrients, recommended dose and applied dose of the respondents. The information was collected and analyzed with acceptable statistical methods via personal interview.

5.1.1 Socio-personal Profile of respondent

Socio-personal profile of the SHC respondents found that majority (81%) of the SHC respondents were of middle age and (12.50%) most of them had high school to higher secondary level of education. The majority of respondents (60.00%) were having medium size of family, in case of the studies indicated that all of the

respondents were involved in agriculture and majority of them (65.33%) had more than 20 years farming experience.

5.1.2 Socio-economic profile of the SHC respondent

Socio-economic profile of the SHC respondents observed that the respondents were involved in only agriculture and not any other subsidiary occupation followed by (80.00%) per cent and (10%) were involved both in agriculture + labour. The (59.17%) per cent of the respondents were marginal farmers and having up to 1 ha. of land holding' followed by (31.67%) per cent of the soil health card respondents had up to 1.1-2 ha of 'small land holding 'in case of the annual income most of the SHC respondents (67.50%) was between Rs. 100000-250000, and (79.17%) per cent of the study area covered by the Vertisols (Kanhari).

5.1.3 Socio-Psychological Variables

As regards to cosmopolitanism, majority of the respondents (85.83%) had low cosmopolitanism, followed by 5.83 per cent of them had nil and medium cosmopolitanism and only 3.33 per cent of them had high cosmopolitanism. in case of majority of the economic motivation (65.00%) had medium level of economic motivation, Regarding the innovativeness of the respondents, reveals that majority of the respondents were medium innovative (65.00%) and followed by 25.83% per cent of them had high innovativeness. In case of information seeking behavior. Most of the respondents (65.83% SHC respondents) were seeking information from KVK on regular basis.

5.1.4 Characteristics of the farmland owned by respondents

As observed that the characteristics of the farmlands owned by the respondents, majority of the SHC respondents were using the micro-nutrients Zinc in major rabi crops like wheat (75%) and chickpea (91.67%). In rabi season most of the respondents were growing wheat and chickpea. The productivity of wheat crops 12.07 q/ha was more than the productivity of chickpea which is 19.04 q/ha it was found that majority (76.67%) of the respondents had more than 200 percent cropping

intensity medium and majority (23.33%) of them had medium level of cropping intensity

5.2 Characteristics of the farmland owned by respondents

5.2.1 Impact of soil health card scheme on adoption of nutrients management practices

The different level of adoption categories such as in application of nutrients in wheat crops DAP majority (87.50%) of the respondents had recommended dose adopted followed by application of plants nutrients (FYM) farm yard manure (85.83%) of the respondents had recommended dose adopted and only (66.67%) of respondents had recommended dose.

Urea and application of plant nutrients followed by (77.50%) of the respondent had recommended dose adopted Zink and (80.83%) of the respondents had recommended dose of nutrients adopted MOP in wheat crops maximum 40.00% of the respondents had below recommended dose adopted Urea followed by 22.50% of the respondents had below recommended dose adopted Zink and only 19.17% of the respondents had below recommended dose MOP followed by 14.17% of the respondents had below recommended dose adopted FYM (farm yard manure) about (12.50%) of the respondents had below recommended dose adopted DAP In case of chickpea crops application of plant nutrients Rhizobium majority (91.67%) of the respondents had recommended dose adopted followed by application of plants nutrients MOP (87.50%) of the respondents had recommended dose adopted and only (69.17%) of respondents had recommended dose adopted DAP Followed by (81.67%) of the respondents had recommended dose adopted Urea and (55.83%) of the respondents had recommended dose adopted.

Zink in chickpea crop maximum 44.17% of the respondents had below recommended adopted Zink nutrients followed by (30.83%) of the respondent had below recommended dose adopted DAP and only (18.33%) of the respondent had below recommended dose adopted urea followed by (8.33%) of the respondents had below recommended dose adopted rhizobium

Application of recommended and applied dose (%) of plant nutrients in major rabi crops From the Table 4.21, it was observed that there was significant influence of dose of per cent among different plant nutrients. In wheat crop, the difference dose of per cent in different nutrients *viz.* Urea, DAP, MOP, Rhizobium and farm yard manure were 81, 95.12, 96.23, 59.49 and 38.33 %, respectively. Similarly, in chickpea crop, the dose of per cent varied from 87.17, 87.68, 75.51, 65.79, 36.25 and 65.02 %, respectively. Overall, the average dose of per cent for wheat was 62.44 % whereas in chickpea it was 43.42 % on the basis of recommended soil health card nutrient management practices in major rabi crops.

5.3 Correlation analysis

Correlation coefficient between independent variable such as education, annual income, land holding, information seeking behavior, soil type, productivity, variables was significance at 0.01 probability level whereas only one variable use of nutrients was significant at 0.05 probability level and eight variables age, family size, farming experience, occupation, cosmopolitaness economic motivation, innovativeness cropping intensity was not significant in case of wheat crops respondents.

Correlation coefficient between independent variable such as education, annual income, land holding, information seeking behavior, productivity, variables was significance at 0.01 probability level whereas only two variables use of nutrients, soil type was significant at 0.05 probability level and eight variables age, family size, farming experience, occupation, cosmopolitaness, economic motivation, innovativeness, cropping intensity was not significant. In case of chickpea respondent

5.4 Constraints associated with the use of SHC

The analysis on constraints showed that majority (58.33%) of SHC respondents were without the support of an agricultural/extension agent, it is difficult to comprehend the information on SHC., followed by lack of knowledge about what is SHC and its use even after receiving the card (29.16%) respondents, (20.83%) respondents 'problem was unavailability of SHC before crop season and

another few respondents (10.00%) faced problem was high cost of fertilizers (Recommended in SHC).

5.5 Suggestions given by the SHC respondents

The analysis on suggestions showed that (25.00%) respondents suggested that RAEO/Gramsevaks should come before sowing to interpretate the content/recommendation of SHC, followed by Training should be given on proper method of collecting soil sample (20.83%). SHC should be given personally to the farmers and should made available on time (20.00%), Few respondents (1.66%) of them also suggested that method of fertilizer application should be given.

CONCLUSION

- Majority of the SHC respondents were of middle age having 36 to 55 years old and were studied up to higher and higher secondary School. Most of the respondent had (up to 1) hectare of land is marginal land holding and medium size of family with 5 to 8 members and come under medium size of family Farming experience respondents had high farming experience (above 20 years),
- Most of the SHC respondents having annual income of Rs. 100000 to 25.00.00.
- Only agriculture and not any other subsidiary profession were the maximum respondents involved.
- Majority of the respondents were medium level innovative, having medium economic motivation, and were medium cosmopolite. Most of the SHC respondents were information seeking information from KVK on regular basis.
- maximum respondents were having medium use of information seeking behavior. Majority were utilizing 5>12 sources of information.
- The finding shows that most of the SHC respondent applied micro nutrients Zink in major rabi crops.
- Majority of the SHC respondent were copping intensity is more than 200%.
- The results obtained shows that the area, production and productivity under chickpea crop of is more than the wheat crop covered.

- Majority of SHC respondents were facing difficulty in understanding the information given in SHC without the assistance of an agricultural/extension officer.
- Maximum SHC respondents suggested RAEO/Gramsevaks should come before sowing to interpretate the content/recommendation of SHC.
- Adoption about Urea DAP, MOP, Zink, rhizobium, FYM, application of plant nutrients in major rabi crops adopted under recommended dose of nutrients most of the respondent belonging.
- Correlation coefficient between education, annual income, land holding, source of information, soil type, productivity, variables were found to be positive and highly significant with the dependent variable (adoption of recommended nutrients management practices in wheat crop) and other independent variable use on nutrients has positive and significant relation with dependent variable.
- Correlation coefficient between education, annual income, land holding, source of information, soil type, productivity, variables were found to be positive and highly significant with the dependent variable (adoption of recommended nutrients management practices in chickpea crop) and other independent variable use on nutrients and soil type has positive and significant relation with dependent variable.

SUGGESTIONS AND RECOMMENDATIONS FOR FUTURE WORKS

On the basis of the results obtained from the search and the knowledge gained from the investigation, it is proposed that:

1. A roughly similar research is needed with a bigger population in other areas of the state to assess the impact of the SHC scheme on main crop productivity.
2. A further research should be conducted to evaluate how SHC respondents feel about the current SHC scheme's improvements.
3. A study studies farmers from the several regions on different aspects of SHC should be implemented.

4. A systematic research should be conducted to assess the opinions of SHC participants in order to reduce the program's barriers.

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8. आपकी भूमि संबंधी जानकारी दीजिए?

1. कुल भूमि (एकड़ में)
1. स्वयं की भूमि
2. रेगहा पर दी गयी भूमि
3. रेगहा पर ली गयी भूमि
4. कुल कृषि भूमि

9. आपका विभिन्न व्यवसायों से होने वाली कुल वार्षिक आय कितनी है—

क्र.	व्यवसाय	मुख्य	सहायक	वार्षिक आय/वर्ष	
1	कृषि				
2	मजदुरी				
3	नौकरी				
4	पशुपालन				
5	व्यापार				
6	अन्य व्यवसाय				
कुल वार्षिक आय					

10. भूमि का प्रकार

क्र.	भूमि का प्रकार	क्षेत्रफल (एकड़)		
		एकड़ में	सिंचित	असिंचित
1.	भाटा			
2.	मटासी			
3.	डोरसा			
4.	कन्हार			
	कुल			

11. क्या आप मृदा स्वस्थ्य कार्ड का उपयोग कर रहे हैं? यदि हां तो कब से

12. आप खेती कब से कर रहे हैं? जानकारी दें।

क्र.	रबी फसलों के नाम	वर्ष (कब से)
1		
2		
3		
4		
5		
6		
7		
8		
9		

13. आप मृदा स्वास्थ्य कार्ड योजना के बारे में जानकारी प्राप्त करने के लिए कहां-कहां जाते हैं? कृपया जाने का अंतराल बताइये।

क्र	स्थान का नाम	सम्पर्क की अवधी
1	गाँवों में	प्रतिदिन सप्ताह में एक बार सप्ताह में दो बार माह में कभी कभी कभी नहीं
2	शहर में	प्रतिदिन सप्ताह में एक बार सप्ताह में दो बार माह में कभी कभी कभी नहीं
3	विकास खण्ड में	प्रतिदिन सप्ताहमें एक बार सप्ताह में दो बार माह में कभी कभी कभी नहीं

14. कृपया आप आर्थिक अभिप्रेरणा संबंधित कथनों पर सहमती अथवा असहमति पर अपना अभिमत दें।

क्र.	कथन	प्रतिक्रियाएँ				
		पूर्णतः असहमत	असहमत	अनिश्चित	समहत	पूर्णतः समहत
1	एक किसान को आर्थिक लाभ के बजाए अधिक उपज के लिए कार्य करना चाहिए।					
2	सफलतम् किसान वह होता है जो सब से अधिक लाभ कमाता है।					
3	किसानों को ऐसा कोई भी नया तरीका अपनाना चाहिए जिससे उसको अधिकतम लाभ मिले।					
4	किसानों को घर के उपयोग के लिए खाद्य फसलें उगाने के बजाए आर्थिक लाभ के लिए नगदी फसलें उगानी चाहिए।					
5	किसान को अपने जीविका के लिए कमाना चाहिए परन्तु जीवन को आर्थिक आधार पर परिभाषित नहीं कर सकते।					
6	मैं उतना ही पैसा कमाना चाहता हूँ जितना जीने के लिए आवश्यक है।					

15. आपके नवीनता (नवाचार) के स्तर की जानकारी हेतु निम्न प्रश्नों के उत्तर दीजिए।

क्र.	कथन	सहमत	तय नहीं किया	अस्पष्ट
1	मैं मृदा स्वास्थ्य कार्ड आधारित पोषक तत्व प्रबंधन प्रथाओं को सीखना चाहता हूँ।			
2	अगर कृषि विशेषज्ञ मृदा स्वास्थ्य कार्ड के आधुनिक तरीकों पर बात करते हैं तो मैं इस में भाग लेता हूँ।			
3	मैं अपने जीवन के तरीके में बदलाव लाना चाहता हूँ।			
4	मैं अपने पिता की जीवन शैली को देख कर अपनी जीवन शैली को बदलना चाहता हूँ।			
5	मैं चाहता हूँ कि मेरा बेटा एक अच्छा किसान बने।			
6	मुझे लगता है कि मनुष्य का भाग्य भगवान के हाथों में है।			
7	मेरे साथी अक्सर मुझसे सलाह या जानकारी मांगते हैं।			
8	मुझे नए विचारों को आजमाने में मजा आता है।			
9	मैं चीजों को करने के लिए नए तरीके तलाशता हूँ।			
10	जब उत्तर स्पष्ट नहीं होता है तो किसी समस्या को हल करने के लिए मैं अक्सर सुधार करता हूँ।			
11	मैं अपनी सोच और व्यवहार में खुद को रचनात्मक और मौलिक मानता हूँ।			
12	मैं एक आविष्कार शील व्यक्ति हूँ।			

16. आपको मृदा स्वास्थ्य कार्ड योजना के बारे में जानकारी कहां कहां से प्राप्त होती है ?

क्र.	जानकारी का स्रोत	नियमित रूप से	कभी-कभी	कभी नहीं
A	व्यक्तिगत स्थानीय			
1	पड़ोसी			
2	रिश्तेदार			
3	प्रगतिशील किसान			
4	स्थानीय नेता			
B	ग्रामीण कृषि विस्तार अधिकारी/कृषि विकास अधिकारी			
1	अनुभागीय कृषि अधिकारी			
2	विषय वस्तु विशेषज्ञ/कृषि वैज्ञानिक			
3	कृषि विज्ञान केन्द्र			
4	कृषि पत्रिकाएँ			
5	टेलीविजन में कौन सा चैनल			
6	किसान कॉल सेंटर			
7	इंटरनेट			
8	समुह चर्चाएँ			
9	किसान मेला			

17. क्या आप पोषक तत्वों का उपयोग करते हैं? हाँ/नहीं यदि हाँ तो बतायें।

क्र.	फसल के नाम	मुख्य पोषक तत्वों के नाम	कि.ग्रा./एकड़	बोरी/एकड़.	NPK/एकड़.
1	गेंहू	यूरिया			
		डी.ए.पी.			
		एमओपी			
		जिंक			
		गोबर की खाद			
		सूक्ष्म पोषक तत्व Micro			
		जिंक,			
2	चना	यूरिया			
		डी.ए.पी.			
		एमओपी			
		जिंक			
		गोबर की खाद			
		सूक्ष्म पोषक तत्व Micro			
		जिंक,			

18. आप वर्ष में कौन कौन से फसल लेते हैं? जानकारी दें।

क्र.	मौसमी फसलों के नाम	कुल फसलीय क्षेत्र	शुद्ध खेतीवाला क्षेत्र	
			सिंचित	असिंचित
1	खरीफ फसल 1. 2. 3. 4. 5.			
2	रबी 1. 2. 3. 4. 5.			
3	जायद 1. 2. 3. 4. 5.			

19. प्रमुख रबी फसलों की उत्पादकता क्या है ?

क्र	प्रमुख रबी फसलों के नाम	कुल क्षेत्र एकड़ में	कुल उत्पादन एकड़ में	कुल उत्पादन हेक्टेयर में
1	गेहूँ			
2	चना			
3	सरसों			
4	तिल			
5	मटर			
6	अन्य फसल			

20. रबी फसलों के अनुशंसित पोषक तत्वों के उपयोग करते समय आपको कौन-कौनसी बाधाएं/समस्याएँ आती हैं? कृपया बतायें।

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21. रबी फसलों में अनुशंसित पोषक तत्वों के उपयोग करते समय जो बाधाएं/समस्या आती हैं। उसे दूर करने हेतु आप क्या-क्या सुझाव देना चाहेंगे, कृपया बतायें।

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बी.

आश्रित चर

क्रं.	गेहूँ की फसलों में पोषक तत्वों का प्रयोग	अनुशंसित खुराक की मात्रा		अनुशंसित खुराक की मात्रा से नीचे	
		आवृत्ति	प्रतिशत	आवृत्ति	प्रतिशत
	पोषक तत्व				
1	यूरिया का प्रयोग				
2	डीएपी का प्रयोग				
3	एमओपी का प्रयोग				
4	जिंक का प्रयोग				
5	गोबर की खाद का प्रयोग				

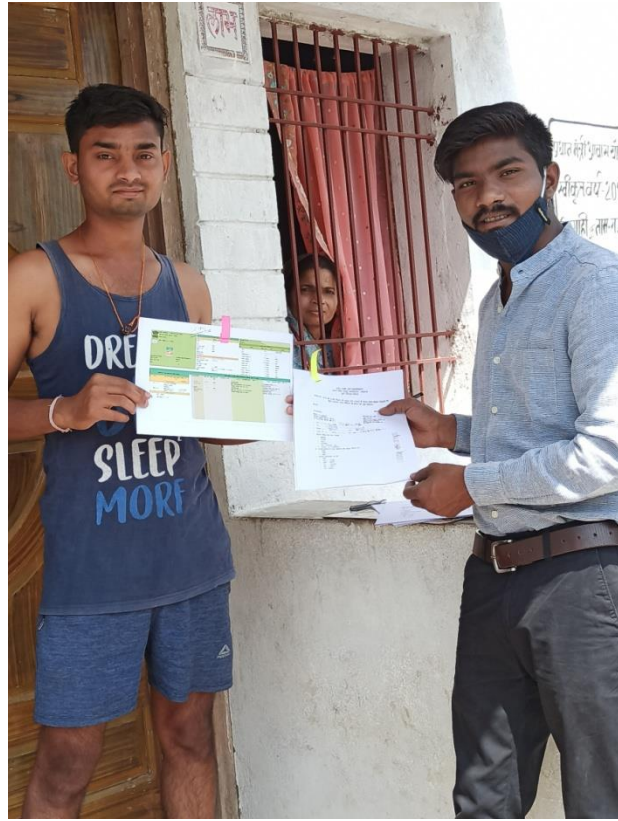
प्रमुख रबी फसलों में पौधों के पोषक तत्वों की अनुशंसित और अनुप्रयुक्त खुराक (%) का प्रयोग

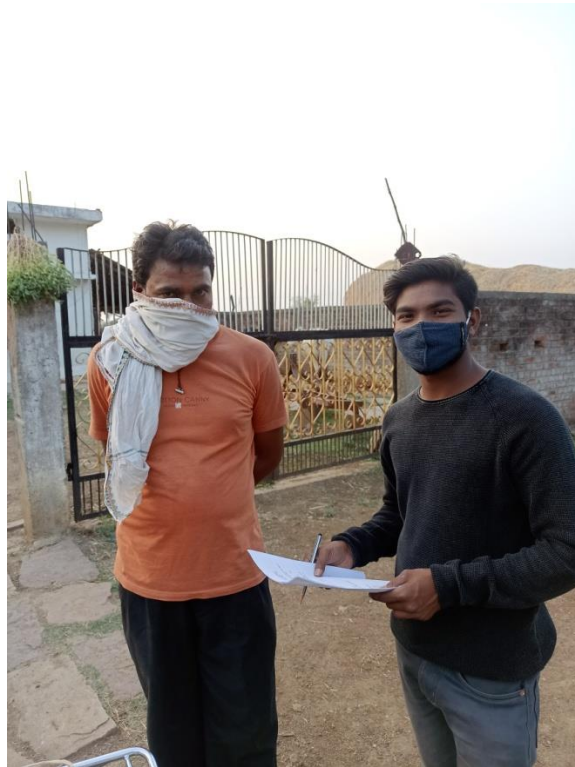
क्रं.	औसत उपयोग में पोषक तत्वों का अनुप्रयोग	गेहूँ			चना		
		प्रतिशत की अनुशंसित खुराक	आवेदन (किग्रा./हे.)	प्रतिशत की खुराक	प्रतिशत की अनुशंसित खुराक	आवेदन (किग्रा./हे.)	प्रतिशत की खुराक
1	यूरिया का प्रयोग						
2	डीएपी का प्रयोग						
3	एमओपी का प्रयोग						
4	जिंक का प्रयोग						
5	गोबर की खाद का प्रयोग						
6	रायजोबियम कल्चर						

Appendix-2









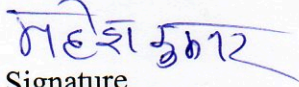
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A socio-economic evaluation of SHC (Soil health card scheme) on status of farmers of Chhattisgarh state

Mahesh Kumar, Dr. DK Suryawanshi, PK Sangode, Vinay Bachkaiya and Dr. PK Panday

Abstract

The purpose of this study was to evaluate socio-economic evaluation of soil health card (SHC) on statuses of farmers of Chhattisgarh state. To serve this purpose, a sample size of 120 respondents were selected from 3 blocks of Mungeli district during the year 2020-21. The results of the study showed that majority of the SHC respondents were of middle age having '36-55 years old and were studied up to higher and higher secondary School. They were dependent only on agriculture for living and most of the respondent had (up to 1ha) land holding. The innovativeness of the SHC respondents found that majority of the respondents were medium level innovative (83.00%) having low level economic motivation, and were low cosmopolite. Most of the SHC respondents (65.83%) were information seeking and get the information from Krishi Vigyan Kendra (KVK) on regular basis.

Keywords: socio-economic evaluation, SHC (Soil health card scheme)

Introduction

A Soil Health Card is used to assess the current state of soil health and, over time, to identify changes in soil health that are influenced by land management. A Soil Health Card displays soil health indicators as well as the descriptive terms associated with them. In most cases, the indicators are based on farmers' practical experience and knowledge of local natural resources. The card contains a list of soil health indicators that can be evaluated without the use of technical or laboratory equipment. The soil health card scheme is one of the flagships programmers of the Government of India, which was launched on February 19, 2015. Scheme managed by the Integrated nutrients Management Division (INM) of the Ministry of Agriculture Cooperation and Farmers Welfare (AC&FW), Government of India (GoI) SHC is a printed report that is given to a farmer for each of his holdings. It will include the status of his soil in terms of 12 parameters, including N, P, K (Macronutrients); S (Secondary-nutrient); Zn, Fe, Cu, Mn, Bo (Micronutrients); and pH, EC, OC. Based on this, the SHC will recommend fertilizer and soil amendments for the farm. A socio-economic evaluation of soil health card (SHC) on statuses of farmers of Chhattisgarh state and its influence on nutrient management practices was aimed in present study. Total no. of soil health card distributed in India during the year 2015- to 2017 no of farmers covered (1.10.74) crore soil health card were distributed to farmers in cycle II 2017-19 (11.69) crore soil health card have been distributed to farmers across the country Total no. of soil health card distributed in Chhattisgarh state during the year 2017-18 to 2018-19 no of farmers covered (2.991.364) and Total no. of soil health card distributed in Mungeli district during the year 2017-18 to 2018-19 no of farmers covered (101.315) Total no. of soil health card distributed in Chhattisgarh state during the year 2019-20 to 2020-21 no of farmers covered (6.807) and Total no. of soil health card distributed in Mungeli district during the year 2019-20 to 2020-21 no of farmers covered (132)

Materials and Methods

The study was conducted during the year 2020-2021 in the Mungeli district of Chhattisgarh state covering three blocks i.e., Mungeli Lormi and Patharia. Four villages were selected randomly from each of the block, making 12 Villages and 120 SHC respondent. The data was collected by personal interview with the help of well prepared, structured and pretested interview schedule. The data collected were tabulated and analyzed using appropriate statistical tools and methods.

Results and Discussion

The findings regarding age of the respondents are presented in Table 1. The data revealed that majority (67.50%) of the respondents belonged to the middle age group (between 36 to 55 years), education status found that 50 percent of the farmers were educated from primary through middle school. The data regarding family size indicated that, 60.00 per cent of the respondents were having medium size of family (5 to 8 members), Regarding experience of farming, data shows that 65.97 per cent respondents had high farming experience (above 20 years), The results on occupation of the

respondents shows that main occupation of majority of the SHC respondent (80%) was agriculture and reveals that the maximum 59.17 per cent respondents were marginal farmers. The majority of respondents had up to 1 ha of land holding (marginal farmers). The result of the income analysis shows that majority of SHC respondents (67.50%) belonged to Rs 100000-250000 income group The data regarding cosmopolitaness are presented in the results show that majority of the respondents (85.83%) had low cosmopolitaness.

Table 1: Distribution of the respondents according to their socio-economic evaluation of SHC (soil health card scheme) on status of farmers

S. No.	Particular	SHC Respondents (n=120)	
		F	%
1.	Age		
i.	Young (Up to 35 years)	23	19.17
ii.	Middle (36 to 55 years)	81	67.50
iii.	Old (More than 55 years)	16	13.33
2.	Education		
i	Illiterate	31	25.83
ii	Primary (Up to 5th class)	33	27.50
iii	Middle (6th to 8th class)	35	29.17
iv	H. school /Higher secondary (9 th to 12 th class)	14	11.67
V	College level	07	5.83
3.	Size of family		
I	Small (< 4 members)	29	24.17
ii	Medium (5 to 8 members)	72	60.00
iii	Large (>8 members)	19	15.38
4.	Farming experience		
I	Low experience (Up to 10 Years)	08	6.67
ii	Medium experience (11 to 20 Year)	36	30.00
iii	High experience (more than 20 years)	76	65.33
5.	Occupation		
I	Agriculture	96	80.00
Ii	Agriculture +Business	04	3.33
Iii	Agriculture + Labour	12	10.00
Iv	Agriculture + Service	05	4.17
V	Agriculture + Other	03	2.5
6.	Land holding		
I	Marginal (up to 1 ha)	78	59.17
Ii	Small (1.1-2 ha)	38	31.67
Iii	Medium (2.1- 4 ha)	08	6.67
Iv	Large (>above 4 ha)	03	2.5
7.	Annual income		
I	<Rs. 100000	14	11.67
Ii	Rs. 100000-250000	81	67.50
Iii	Rs. 250000-500000	15	12.50
Iv	>Rs. 500000	10	8.33
8.	Cosmopolitaness		
I	Nil (Never)	07	5.83
Ii	Low (Once in a month)	103	85.83
iii	Medium (Once in a week)	06	5.00
Iv	High (Twice or more in a week)	04	3.33

Economic motivation

The data presented in Table 2 and Fig. 1 were subjected to percentage distribution of the respondents according to their economic motivation. The data indicates that majority of the respondents (65.00%) had medium level of economic motivation, while 20.83 per cent had low and 14.17 per cent had high level of economic motivation.

Table 2: Distribution of respondents on the basis of economic motivation

“(n=120)”			
S. No.	‘Category’	Frequency	Percentage
1.	Low	25	20.83
2.	Medium	78	65.00
3.	High	17	14.17
Mean	11.69	SD 3.46	

This may be due to the reason that the respondents were still not thinking agriculture as a business and the irregular climatic and marketing factors made them not to think about rainfall profits. Moreover, the uncertainty level in the respondents was increasing day-by-day because of these factors. Hence, such trend was noticed.

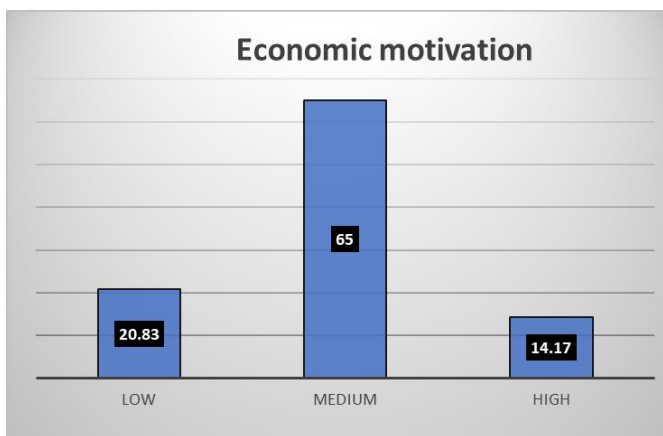


Fig 1: Distribution of respondents on the basis of economic motivation

Information seeking behavior

The information sources are the means of seeking new information, knowledge and guidance about any particular production technology. The source of information not only gives knowledge about the new production technology but also familiarize the farmer with the information as well. The distribution of respondents according to the degree of usage of information sources as seen in Table 3 The data in table furnished that 74.169 per cent of the respondents had “medium level” of exposure to various source of information for getting knowledge about soil health card scheme, followed by 12.5 per cent of the respondents had “low level” of exposure to various information sources and only 33.33 per cent of the respondents were found to have “high level” use of information sources.

Table 3: Distribution of the respondents according to their overall information seeking behavior

“(n=120)”			
S. No.	‘Category’	Frequency	Percentage
1.	Low (<5.16)	15	12.5
2.	Medium (>5-12)	89	74.16
3.	High (>12)	16	33.33
Mean		8.68	SD 3.52

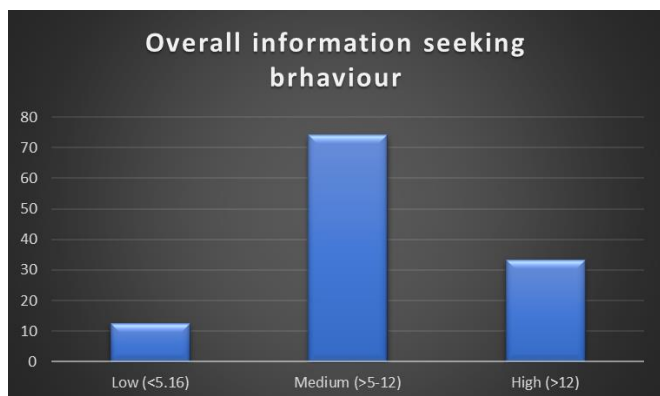


Fig 2: Distribution of respondents on the basis of overall information seeking behavior”

Correlation analysis of independent variables with dependent variable

Correlation of “Recommended dose of application of plant nutrients and adoption of Soil Health Card based nutrient management practices by wheat crop respondents’ with independent variables was carried (Spearman’s rank correlation) out to test the correlation between independent variables with average application of plant nutrients of recommendation of soil health card by the respondent was given in tables 4 out of all three education, land holding, information seeking behaviour, variables was significance at 0.01 probability level and six variables age, family size, farming experience, occupation cosmopolitaness economic motivation, innovativeness was not significant.

Table 4: Correlation “average application of nutrients” adoption of Soil Health Card based nutrient management practices by wheat crops respondents’ with independent variables

(n=120)		
S. No.	Variables	Correlation coefficient
1.	Age	-0.149 ^{NS}
2.	Education	0.256 ^{**}
3.	Family size	-.168 ^{NS}
4.	Farming experience	0.129 ^{NS}
5.	Occupation	0.106 ^{NS}
6.	Land holding	0.523 ^{**}
7.	Cosmopolitaness	0.103 ^{NS}
8.	Economic motivation	0.043 ^{NS}
9.	Innovativeness	0.134 ^{NS}
10.	Information seeking behaviour	0.312 ^{**}

* Significant at the 0.05 level of probability
 ** Significant at the 0.01 level of probability
 **NS – not significant

Conclusion

Majority of the SHC respondents were of middle age having '36 to 55' years old and were studied to higher secondary level. Most of the respondent had marginal land (1 hectare land) holding with medium size of family. Farming experience respondents had high farming experience (above 20 years) Most of the SHC respondents having annual income of Rs. 100000 to 25,00,00 and dependent on agriculture as only profession having medium level innovative thinking, medium economic motivation, and medium cosmopolite. Most of the SHC respondents were information seeking and obtained information mostly from KVK on regular basis. However, over all information seeking behaviour reveals that majority of respondents (74.16%) have medium level of information seeking behaviour

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