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RESEARCH ARTICLE

AN INDEX FOR MEASURING KNOWLEDGE AND ADOPTION BEHAVIOR OF SOIL HEALTH CARD RECOMMENDATIONS IN MANDYA DISTRICT OF KARNATAKA

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Abstract

The present study was carried out during 2018-19 to analyse the knowledge level of soil Health Card (SHC) beneficiaries and their adoption behavior on recommendations done in Soil Health Card. Out of 120 soil health card beneficiaries 60 were selected from each taluk by taking six villages in Mandya and Maddur taluks of Mandya district. Ten SHC beneficiaries from each village were randomly selected for the study. Data was collected using a pre-tested interview schedule. A perusal of this table revealed that about 53 percent belongs to middle age (35 to 50 years) however, one third of the respondents (33.33 per cent) belongs to old age category and 22.50 per cent were belongs to young age. Most of the respondents were educated from primary school level to post graduation level (Percentage varies). More than one third of the respondents (43.33 %, 41.66% and 40.83 %) were having high cosmopolitaness and medium mass media exposure and high Extension agency contact respectively. More than one third of the SHC beneficiaries were having medium extension participation (40.00%), medium achievement motivation (42.50%), medium scientific orientation (40.83%) and followed by high and low groups. Almost 96.66 per cent of the SHC beneficiaries have knowledge on the major nutrients covered in SHC' and 87.50 per cent of the SHC beneficiaries have knowledge on the place from where soil samples should be collected. Majority of the Soil Health Card beneficiaries (95 %) adopted application of major nutrients like nitrogen, phosphorus and potash as recommended in soil health cards. one fourth of soil health card beneficiaries (28.33%) were applying micro nutrients as recommended in SHCs. This may be due to lack of knowledge on the importance of micro nutrients to the crops. More than three fourth of the soil Health Card beneficiaries are adopted ideal depth while collecting soil sample. More than half of the SHC beneficiaries are aware of ideal time of soil sampling and followed it. This may be due to high and medium level of cosmopolitaness, Extension participation and mass media exposure. Before distributing soil health cards, a series of interactions and technical training programmes organized by agriculture department and other stakeholders helps to achieve better adoption of soil health management aspects.

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Introduction:-

Soil health plays a vital role to ensure agricultural production in a sustainable manner. Deteriorating soil health has been a cause of concern, which has been lead to decline in utilization of farm resources. Imbalanced use of fertilizers, low addition of organic matter and non-replacement of depleted nutrients over the years have resulted in nutrient deficiencies and decrease in soil fertility in many parts of the country. Soil health needs to be assessed at regular intervals so as to ensure that farmers apply the adequate nutrients while growing nutrient exhaustive crops.

The central and state governments took many steps to sustain soil health for maximizing crop production since from 1955-56. Soil testing programme was implemented through National Mission for Sustainable Agriculture (NMSA) and Rashtriya Krishi Vikas Yojana (RKVY) (Anonymous, 2012). However, no uniform norms were followed in the country for soil analysis and distribution of such information before the issue of Soil health cards. Further, these initiatives were sporadic and random and therefore did not cover all the farmers within a particular time cycle. Keeping this in view, Central Government had launched the Soil Health Card scheme in February 2015 with an aim to promote soil test based application of fertilizers in the country and to implement uniform norms in sampling and testing of soil.

The soil health card scheme brings together the scientific community, the information repository, techniques and cropping practices, the farmers and the government for the economic development of the farming community at large. Since, change in knowledge preceded acceptance and application of an innovation, it was therefore, always important to find out the factors responsible for positive or negative disposition associated with farmer toward the soil health card. Hence, an attempt was made to measure the knowledge of farmers on Soil Health Card and scientific amelioration of adoption problems. Keeping this in view, the present investigation was designed with the following objectives.

1. To compute the knowledge index for measuring the knowledge on soil Health Card beneficiaries
2. To study the socio-economic and psychological characteristics of SHC beneficiaries
3. To assess the adoption behaviour of SHC beneficiaries on the recommendations.

Research Methods:-

Locale of study and sampling plan

The study was conducted in Mandya district of Karnataka state. Mandya is located at 12.52°N 76.9°E. It has an average elevation of 678 metres (2,224 ft). As of 2011 India Census, Mandya had a population of 131,211. Males constitute 51 per cent of the population and females 49 per cent. Mandya has an average literacy rate of 73%, higher than the national average of 59.5 per cent: male literacy is 77 per cent, and female literacy is 68 per cent. There is a brief history of 75 years to Mandya. Mandya celebrated its 75th year (Amrutha Mahotsava) in 2015. The magnificent KRS dam was designed by Sir M. Visvesvaraiaha in Mandya. Sugar factories contribute to the major economic output. So it is called as Sakkare Nadu. Mandya and Maddur talukas were selected among the seven talukas of the Mandya district, based on the highest number of soil health card distributed. Three villages from Mandya and three villages from Maddur taluk were selected purposively for the study based on highest soil health card distribution. Twenty respondents were selected from each village and constituted total sample of 120 farmers.

Development of Knowledge test

A Knowledge test was developed using the procedure described by Linguist (1951).

- a) **Collection of items:** The content of knowledge test is composed of questions called items. A comprehensive list of items of soil health management traits was prepared by consulting of relevant literature and experts of soil science of College of Agriculture, VC Farm, Mandya. The experts of soil science further validated the applicability and suitability of these items in the study area. Criteria for the items selection were (i) It should promote thinking (ii) it should have a certain difficulty and (iii) it should differentiate well informed from less informed. Using this method, a total of 50 items on soil health management traits were selected to form the initial test index to carry out item analysis for developing a knowledge test.
- b) **Form of questions:** All 37 items formed the knowledge test and the questions were objective and dichotomous to facilitate easy and objective scoring.

Difficulty index:

The difficulty of an item varies from individual to individual. When a respondent answers a question / item correctly, it was assumed that the question was less difficult for him. The assumption in this question / item statistics

of difficulty was that difficulty was linearly related to level of respondents' knowledge about reproductive traits. The difficulty index for each of the 37 items was calculated by dividing the total correct responses for a particular question / item by total number of respondents as under

| | |
|---------|-----------------|
| $D_i =$ | $\frac{N_c}{N}$ |
|---------|-----------------|

Where, D_i = Difficulty index;

N_c = Number of respondents answering correctly

N = Total number of respondents

Discrimination index:

If the statement is answered by some respondents correctly and not by others, such a statement has greater power to discriminate more knowledgeable from less knowledgeable ones than another statement which is either answered correctly by everyone or none in the sample. If a statement is so simple that it can be correctly answered by everyone or is too difficult to be correctly answered by anyone, it does not have power to discriminate among respondents' with varying level of knowledge. In a way, the items carrying higher discrimination power implicitly indicates that such items are moderately difficult, and they are the ones that discriminate between the ones who answer it correctly from those who are unable to do so. The discrimination power of all the 37 items were worked out by following method. First, respondents were arranged in descending order on basis of their performance in whole test. Out of this list, top 20 % and bottom 20 % of respondents were treated as high and low groups. For each question, number of top 20 % (N_H) and bottom 20% (N_L) who answered it correctly were counted. The discrimination index was calculated as under:

$$D_i = \frac{N_H - N_L}{n}$$

Where, D_i = Discrimination index;

N_H = Number of respondents in 20 % high groups who answering correctly

N_L = Number of respondents in 20 % low groups who answering correctly

n = Number of respondents in 20 % sample

Point bi-serial correlation:

The main aim of calculating point bi-serial correlation was to work out the internal consistency of items that is the relationship of total scores to a dichotomized answer to any given item. In a way, validity power of item was computed by correlation of individual item of whole test. Point bi-serial correlation for each of item to preliminary knowledge test was calculated (Garrett, 196).

$$r_{pbis} = (M_p - M_q) / SD \times P \cdot Q$$

Where,

r_{pbis} = Point bi-serial correlation

M_p = Mean of the total scores of the respondents who answered the item correctly

M_q = Mean of the total scores of respondents who answered the item incorrectly.

SD = Standard deviation of entire sample

P = Proportion of respondents giving correct answer to item

Q = Proportion of respondents giving incorrect answer to item.

The calculated point bi-serial correlation was tested with (N-2) degree of freedom.

- i) **Final selection of items:** The items having difficulty index between 0.25 – 0.75, discrimination index above 0.20 and bi-serial correction significant at 5% level were finally selected for final knowledge test. A total of 36 items constituted the knowledge test.
- ii) **Reliability of knowledge test:** The reliability of test was assessed by using split half technique. The test consisting of 36 items was administered to 30 respondents selected randomly in non-sample areas. The responses to all the thirty six items were scored as 1 for correct and 0 for incorrect. The total scores obtained by each of the respondents on odd and even numbered items in respect of two halves of test were calculated separately. The Pearson product moment correlation coefficient between the two sets of scores was calculated. The 'r' value thus calculated as 0.79 which was significant at 1% level of probability. Thereby, indicating that this test had high internal consistency.
- iii) **Validity of knowledge test:** The validity of knowledge test was established through Content validity. All possible care was taken in incorporation of the statements covering all aspects on soil health management

traits. All the statements were subjected to item difficulty, discrimination index and point bi-serial correlation before selection of the final statements. Hence, it was logical to assume that the test satisfies representation as well as sensible method of test construction, the criteria for content validity.

Knowledge test consisted of 36 statements. For an individual SHC beneficiary, minimum and maximum knowledge scores were 36 and 108, respectively. Each trait measured independently and an overall knowledge was also calculated through the knowledge index.

$$\text{Knowledge index} = \frac{\text{Scores obtained by respondents}}{\text{Maximum obtainable score}} \times 100$$

Results And Discussion:-

Personal and Socio-Economic and psychological characteristics of the SHC beneficiaries

Table 1 describes the personal, socio economic and psychological characteristics of SHC beneficiaries. A perusal of this table revealed that about 53 percent belongs to middle age (35 to 50 years) however , one third of the respondents (33.33 per cent) belongs to old age category and 22.50 per cent were belongs to young age. Most of the respondents were educated from primary school level to post graduation level (Percentage varies). However, 10.83 per cent of the respondents were found to be illiterate. The probable reason for majority of farmers to be educated up to high school to graduation level might be due to their annual family income and availability of educational institutions in their locality. The reason behind illiterates could be lack of encouragement from family members, lack of interest and their poor economic status. Majority of the respondents were small farmers (62.50 per cent) followed by semi-medium farmers (17.50%). The probable reason might be due to fragmentation of land within the family at rural area. Majority of the respondents were depends on farming and subsidiary enterprises (71.66 %) followed by farming alone. More than one third of the respondents (42.50%) were having medium farming experience. Nearly half of the respondents were deriving low annual income (Rs. 20,254=00) followed by medium and high annual income from their respective occupations. More than one third of the respondents (43.33 %, 41.66% and 40.83 %) were having high cosmopolitaness and medium mass media exposure and high Extension agency contact respectively. More than one third of the SHC beneficiaries were having medium extension participation (40.00%), medium achievement motivation (42.50%), medium scientific orientation (40.83%) and followed by high and low groups. It is also reveals from the Table 1 that, more than one third belongs high risk orientation group (38.33%) followed by low and medium groups.

Table 1:- Personal, Socio-Economic and psychological characteristics of the SHC beneficiaries (n=120).

| Sl. No. | Characteristics | Category | Number | Per cent |
|--------------------------|----------------------|--------------------------------|------------------|----------|
| Personal characteristics | Age | Young (< 35 years) | 27 | 22.50 |
| | | Middle (35 to 50 years) | 53 | 44.16 |
| | | Old (> 50 years) | 40 | 33.33 |
| | Education | Illiterate | 13 | 10.83 |
| | | Primary school | 23 | 19.16 |
| | | Middle school | 24 | 20.00 |
| | | High school | 25 | 20.83 |
| | | PUC | 26 | 21.66 |
| | | Diplome | | |
| | | Graduation | 5 | 04.16 |
| | | Post-graduation | 4 | 03.33 |
| | | Land holding | Marginal farmers | 20 |
| | Small farmers | | 75 | 62.50 |
| | Semi-medium farmers | | 21 | 17.50 |
| | Medium farmers | | 4 | 03.33 |
| | Large farmers | | 0 | 00.00 |
| | Occupation | Farming only | 34 | 28.33 |
| | | Farming+ subsidiary enterprise | 86 | 71.66 |
| | Farming experience e | Less | 28 | 23.33 |
| | | M | | |
| Medium | | 51 | 42.50 | |
| | More | 41 | 34.16 | |
| Socio | Annual income | Low (< Rs.20254) | 61 | 50.83 |

| | | | | |
|------------------------|-------------------------------|-------------------------------|-----|-------|
| | | Medium (Rs.20254 to Rs.32651) | 39 | 32.50 |
| | | High (> Rs.32651) | 20 | 16.66 |
| | Cosmopoliteness | Low | 41 | 34.16 |
| | | Medium | 27 | 22.50 |
| | | High | 52 | 43.33 |
| | Mass media exposure | Low | 39 | 32.50 |
| | | Medium | 50 | 41.66 |
| | | High | 31 | 25.83 |
| | Extension agency contact | Low | 35 | 29.16 |
| | | Medium | 36 | 30.00 |
| | | High | 49 | 40.83 |
| | Extension participation | Low | 35 | 29.16 |
| | | Medium | 48 | 40.00 |
| | | High | 37 | 30.83 |
| | Psychological characteristics | Achievement motivation | Low | 34 |
| Medium | | | 51 | 42.50 |
| High | | | 35 | 29.16 |
| Management orientation | | Low | 29 | 24.16 |
| | | Medium | 51 | 42.50 |
| | | High | 40 | 33.33 |
| Scientific orientation | | Low | 27 | 22.50 |
| | | Medium | 49 | 40.83 |
| | | High | 44 | 36.67 |
| Risk orientation | | Low | 42 | 35.00 |
| | | Medium | 32 | 26.67 |
| | | High | 46 | 38.33 |

Knowledge level of SHC beneficiaries

It was observed from Table 2 that among the 30 knowledge statements, 96.66 per cent of the SHC beneficiaries have knowledge on the statement 'Which are the major nutrients covered in SHC' and was accorded the first rank. 87.50 per cent of the SHC beneficiaries had knowledge on the statement 'From where soil samples should be collected?' and was ranked second. The statement 'Who will issue the SHC?' ranked third by the SHC beneficiaries with 85.00 per cent knowledge. The statements 'What is the depth that Soil sample has to be collected in cultivated land other than garden?' and 'Details present in SHC- dosage of fertilizer application to crops' received rank fourth and fifth with 79.16 per cent and 77.50 per cent knowledge respectively. The reason for the highest knowledge regarding these statements might be that SHC beneficiaries are high cosmopolite in nature, medium to high mass media exposure and extension participation. The lower percent of knowledge level of SHC beneficiaries may be attributed to the lack of awareness about the features of SHC scheme and recommendations made on application of secondary and micro nutrients.

The SHC beneficiaries had more than 50 per cent knowledge on soil Health Card and its usage. The **Knowledge Index=55.16 %**

Table 2:- Soil Health Card beneficiaries' Knowledge on issues related to Soil Health Card and its usage.

| Sl. No | Statements on Knowledge of Soil Health Card and its usage | Knowledge (%) |
|--------|--|---------------|
| 1 | What is the ideal time for soil sampling? | 63.33 |
| 2 | Who will draw the soil sample? | 45.83 |
| 3 | From where soil samples should be collected? | 87.50 |
| 4 | In irrigated area, soil samples will be drawn in how much area? | 18.33 |
| 5 | What is the depth that Soil sample has to be collected in cultivated land other than garden? | 79.16 |
| 6 | Do you know about the soil sample testing institutes/ organization? | 72.50 |
| 7 | When was the SHC scheme initiated? | 60.00 |
| 8 | What is the validity period of SHC recommendations | 55.83 |

| | | |
|----|---|-------|
| 9 | What are major nutrients covered in SHC | 96.66 |
| 10 | What are secondary nutrients present in SHC | 19.16 |
| 12 | What are the micro nutrients mentioned in SHC | 26.66 |
| 13 | Is it SHC provides information about pH and EC | 45.83 |
| 14 | Can we improve the fertility status and productivity of soil through SHC information? | 70.00 |
| 15 | Can we alter the crop planning and scientific farming through SHC information? | 72.50 |
| 18 | The pH value for acidic soil ranges between – 4 to 6 | 70.83 |
| 19 | Organic manure is essential for maintaining- water holding capacity and fertility of soil | 64.16 |
| 20 | The application of bio fertilizer helps in- Improving the supply of nutrients to plants and promotes root growth and increases the yield | 68.33 |
| 21 | What is used as an amendment for acidic soil? | 75.00 |
| 22 | What is used as an amendment for alkaline soil? | 75.00 |
| 23 | How soil fertility will be maintained? | 76.66 |
| 24 | How crop yield can be enhanced? | 67.50 |
| 25 | Do you know the application of fertilizers to the field based on the recommendation of soil health card? | 46.66 |
| 26 | Waiting period for getting SHC is 3 months | 33.33 |
| 27 | Who will issue the SHC? | 85.00 |
| 28 | Amount charged by KVK for analysis of soil sample- 150Rs | 41.66 |
| 29 | The main objective of SHC scheme is- to strengthen functioning of STL's, to diagnose soil fertility related constraints and promote soil test based nutrient management | 60.00 |
| 30 | Details present in SHC- dosage of fertilizer application to crops | 77.50 |

$$\text{Knowledge index} = \frac{1654.92}{3000} \times 100$$

$$\text{Knowledge Index} = 55.16\%$$

Overall knowledge of SHC beneficiaries about Soil Health Card and its usage.

A bird eye view of Table 3 reveals that 27.50 per cent of the SHC beneficiaries had high level of overall knowledge regarding SHC, while 49.16 and 23.33 per cent of the farmers had medium and low level of overall knowledge regarding SHC, respectively. The probable reason for the majority of farmers having medium level of knowledge could be due to the fact that lack of awareness about soil health. The finding was in line with study conducted by Changa (2005).

Table 3:- Overall knowledge of farmers about SHC (n=120).

| Sl. No. | Knowledge category | SHC holders | |
|---------|-------------------------------|-------------|----------|
| | | Number | Per cent |
| 1. | Low(< 20.90 score) | 28 | 23.33 |
| 2. | Medium (20.90 to 23.82 score) | 59 | 49.16 |
| 3. | High (> 23.82 score) | 33 | 27.50 |
| Total | | 120 | 100.00 |

Mean= 22.36; Standard deviation= 2.9

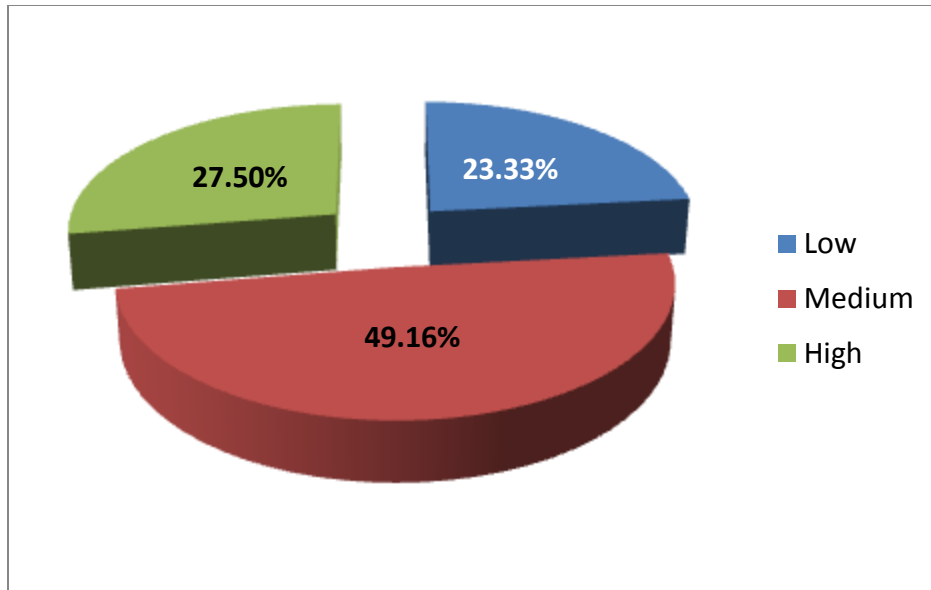


Figure 1:- Over all Knowledge level of SHC beneficiaries.

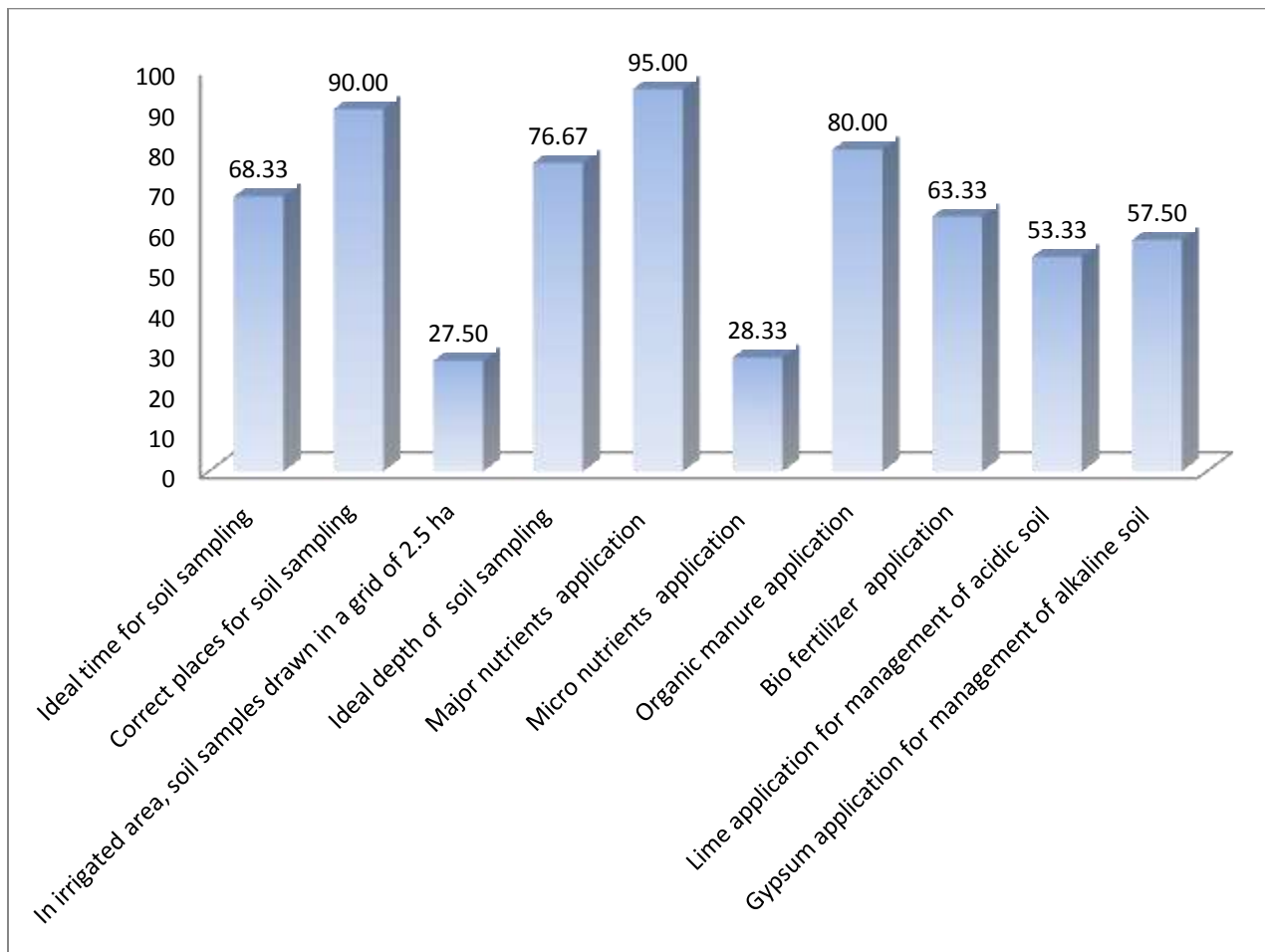


Figure 2:- Adoption of various practices recommended in Soil Health Card.

Figure 2 depicts the adoption behavior of SHC beneficiaries of various practices recommended in soil health card. It was revealed from the study that, majority of the Soil Health Card beneficiaries (95 %) adopted application of major

nutrients like nitrogen, phosphorus and potash as recommended in soil health cards. The probable reason may be that easy availability of complex fertilizers and straight fertilizer in the market and vast farming experience. About 90 % of the soil health card beneficiaries adopted correct places of soil sampling like zig zag manner. About 80 per cent of the soil health card beneficiaries adopted organic manure application to their field and plantation crops. More than one fourth of soil health card beneficiaries (28.33%) were applying micro nutrients as recommended in SHCs. This may be due to lack of knowledge on the importance of micro nutrients to the crops. More than three fourth of the soil Health Card beneficiaries are adopted ideal depth while collecting soil sample. More than half of the SHC beneficiaries are aware of ideal time of soil sampling and followed it. This may be due to high and medium level of cosmopolitanism, Extension participation and mass media exposure. Before distributing soil health cards, a series of interactions and technical training programmes organized by agriculture department and other stakeholders helps to achieve better adoption of soil health management aspects.

Conclusion:-

Soil Health related problems are complex in nature and cause heavy losses to the farming community. Study reveals that overall knowledge of Soil Health Card beneficiaries on knowledge was moderately satisfactory (55.16 %). More than half of the Soil Health Card beneficiaries are knowledgeable on soil management practices, soil sampling techniques and also adverse effects of high or low dose of fertilizer applications. Extension functionaries can be an ideal bridge between research institutions and farming community for the catalytic effect. Through the organization of awareness programme on INM, scientific attitude can be inculcated among the farmers on management of problematic soils. However, easy accessibility of Agricultural Officers at hobli level can check the loss obtained due to lack of knowledge on problematic soils.

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